"Without Wrinkles"

Just in case there may be someone in your organization whose noble brow is rigid with corrugations, we want to pass along this thought on worry, written by George Horace Lorimer a great many years ago when we really had something to worry over!

"The only thing I've ever put into my business which didn't draw dividends in fun or dollars was worry. * * * I've simply found worrying a blamed sight more uncertain than horse-racing—it's harder to pick a winner at it. * * * The time to do your worrying is when a thing is all over, and the way to do it is to leave it to the neighbors."

There are many "wrinkles" in the paper business.

Customers are particular. A wrinkled roll may be the cause of a whole set of human wrinkles—and losses to the mill.

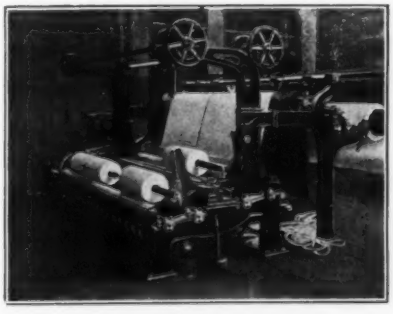
Our Winders handle successfully all grades of Book, Tissue, News and Board.

We have a customer in New Hope who says that he makes about the hardest paper in the world to wind and he asserts that, with our Winder, "We have no trouble in getting a good hard roll."

"Perfect Rolls" such as our Winders are producing for a customer in Massachusetts imply saving of waste, saving of time, continued good-will of customers.

One of the great mills in the Kalamazoo district finds that our machines mean "less waste."

If you will soon be interested in a Winder, Slitter (and Rewinder) that will do its work "Without Wrinkles," it will give us pleasure to send you information and prices.



Four-Drum Winder in operation

The Moore & White Company

Established 1886

North Philadelphia Station, Penna. R. R., PHILADELPHIA, PA.

Paper Machine Builders

Vol. 3—No. 9

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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Eastern Office: Room 1411-1412, 150 Nassau Street, New York City

Removal Notice

We desire to announce the removal of our office to more suitable quarters on the seventeenth floor of the Vanderbilt Concourse Building, 52 Vanderbilt Avenue (opposite Grand Central Station at 45th Street), where we will be pleased to welcome you at your convenience.

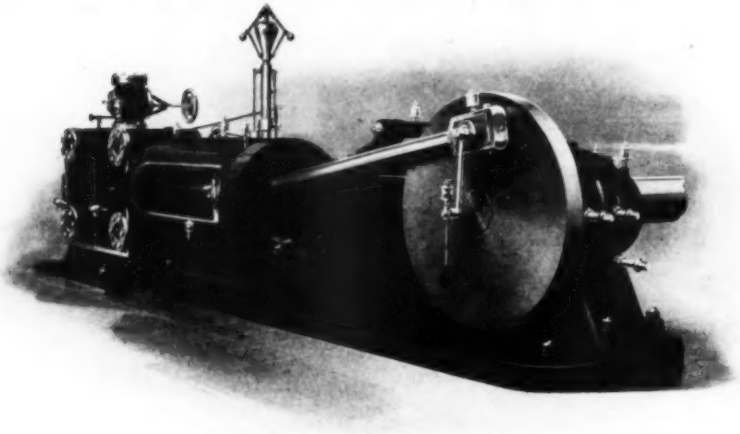
Lagerloef Trading Co.
(INCORPORATED)

Telephone Murray Hill { 4246 4247

Murray Iron Works Company

INCORPORATED 1870

Burlington, Iowa, U. S. A.



Murray Corliss Engines (Simple and Compound)

Murray High Pressure Boilers

Water-Tube (one or two drums) Boilers

Tubular and Internally-Fired Boilers

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SEAMLESS FELTS
TAN JACKETS

Service That Is an Economy

A very definite quality of wool, of blending, of weave and of finish, is required to create a papermakers' felt that will render most satisfactory results under specified conditions.

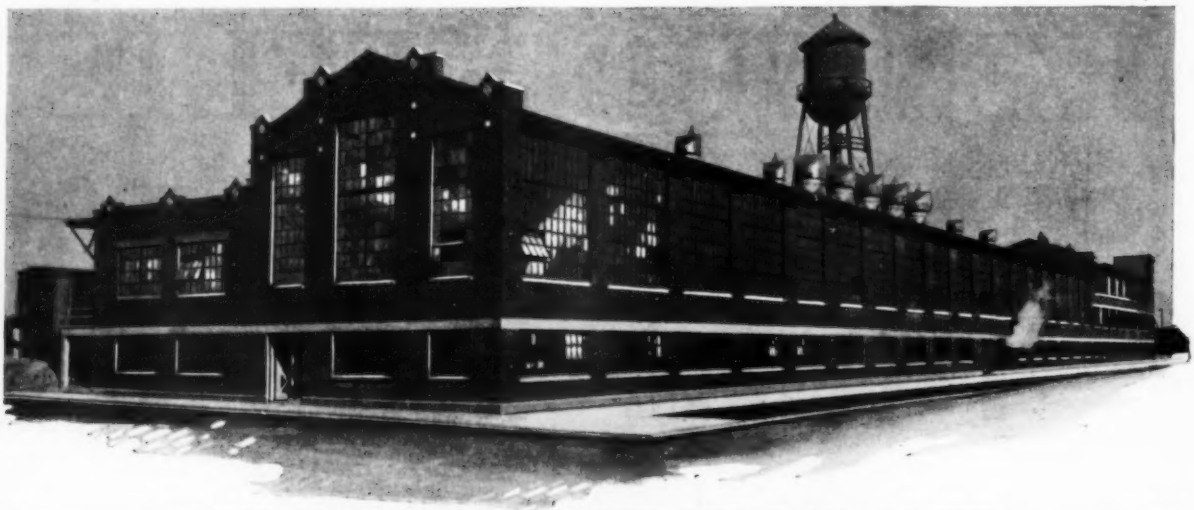
For years the Kenwood research department has been studying these requirements.

Given the quality of paper desired, the type of machine used and the speed at which the felt will run, Kenwood research department can aid materially in the elimination of your felt problems.

The opportunity to work with you to a saving in felt expense will be appreciated.

F. C. HUYCK & SONS
KENWOOD MILLS, ALBANY, N. Y.

218-B



CHILLICOTHE PAPER CO., CHILLICOTHE, OHIO—SIROCCO EQUIPPED
Built by The Austin Company, Cleveland, Ohio

In the plant of the Chillicothe Paper Company, through the application of warm air, water vapor is carried away and drying capacities have been measurably increased.

In the beater, Jordan and machine rooms, vapor removal is vital. Moisture must not be permitted to condense on ceilings, not only for manufacturing reasons, but in consideration of the life of the structure. Properly tempered air in the finishing rooms speeds up the drying of the coatings.

"Sirocco"
TRADE MARK

Thus all through the Chillicothe plant, Sirocco equipment carries off tons of moisture daily, speeding production and keeping the spirit of labor healthy and satisfied.

We have a booklet "A B C Equipment for Paper Mills" which covers the ventilating subject in detail. Do you care for a copy?

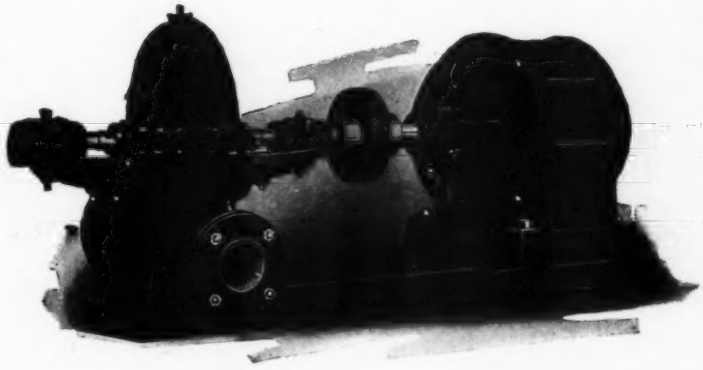
American Blower Company
DETROIT, MICHIGAN

The Machine Room of the Chillicothe Paper Co. is equipped with the "Sirocco" System of Heating and Ventilating to eliminate condensation on ceiling and walls.

"Buffalo"

DOUBLE SUCTION SINGLE STAGE CLASS "S" CENTRIFUGAL PUMPS

Department 27 Has a Lot of Interesting Data for You



Write for Bulletin 952-A

BUILT FOR THE CONTINUOUS SERVICE DEMANDED IN PAPER MILLS

A CENTRIFUGAL PUMP FOR EVERY PUMPING REQUIREMENT

BUFFALO STEAM PUMP CO., Buffalo, N. Y.

Manufacturers of Steam, Power and Centrifugal Pumps and Condensers

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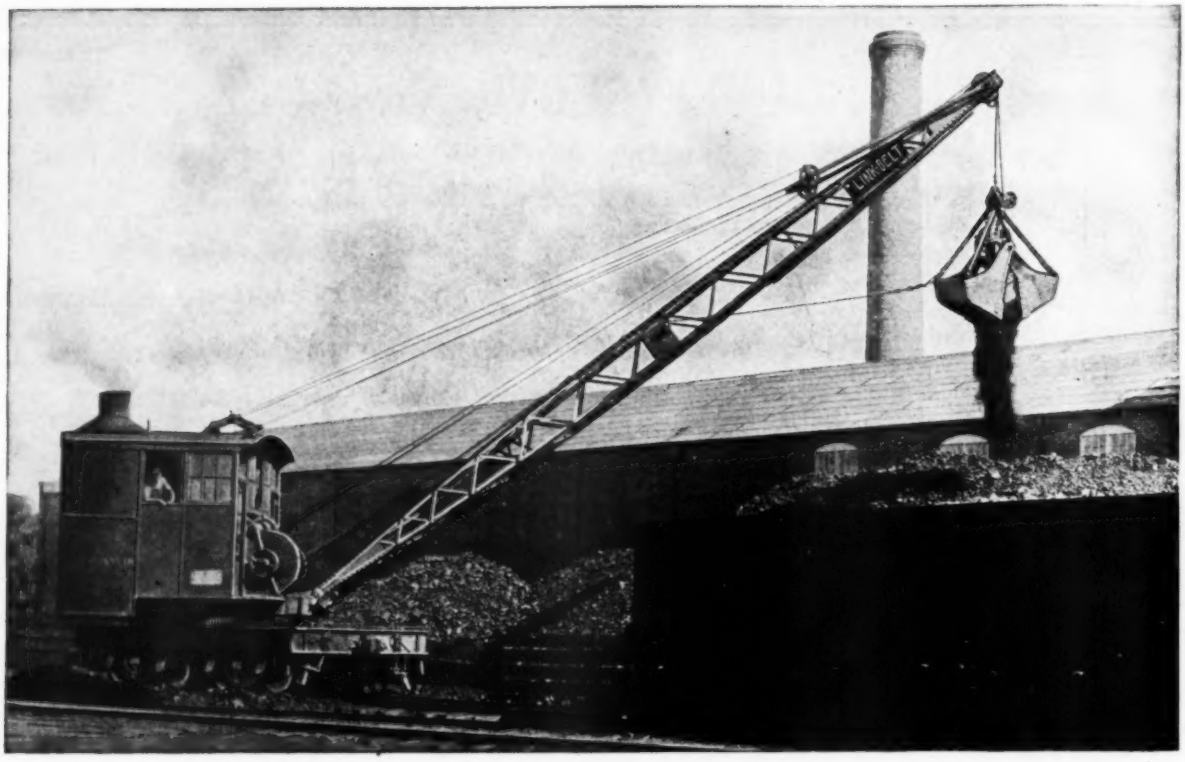
SPRAY NOZZLES

are shown below giving perfect service at Mead Pulp and Paper Co. and Skaneateles Paper Co.

Send for a sample Nozzle

BUFFALO FORGE COMPANY

Buffalo, N. Y.



Cutting Handling Costs 66⅔%

"We got our first Link-Belt Crane in January, 1919. It was purchased primarily to unload coal, but it immediately proved so handy that we have been using it on all kinds of odd jobs about the plant," says Mr. A. Gillis, Chief Eng., Owosso Sugar Co., Lansing, Mich.

"When our plant is operating 24 hours a day, we consume from 125 to 130 tons of coal a day. Coal is shipped to us in 50-ton cars, and unloaded into our storage bins by crane. The Link-Belt crane with a 1½ yard bucket, easily unloads from 10 to 12 cars, aggregating over 500 tons, a day.

"Our plant is busy making sugar from October to the first of January. During this period the beets are shipped to us by freight as fast as we can take care of them. We used to unload them by hand, but are now doing this work entirely by crane. During the shipping season we unload from 500 to 800 tons of beets per day.

"At the 1916 labor rates it would cost us $75 to unload 500 tons of coal by hand, and $44 to unload 400 tons of beets. The Link-Belt crane will handle the coal for $25, the beets for $16. This is a saving of $78 in wages in one day, or $468 in one busy week, over the cost of labor four years ago.

"Our first Link-Belt Crane proved such a useful machine that a few months later we bought another. They have already paid for themselves in wages saved."

Are you using obsolete methods in handling your materials? Let our engineers look over your conditions. Send for catalog.

LINK-BELT COMPANY

843

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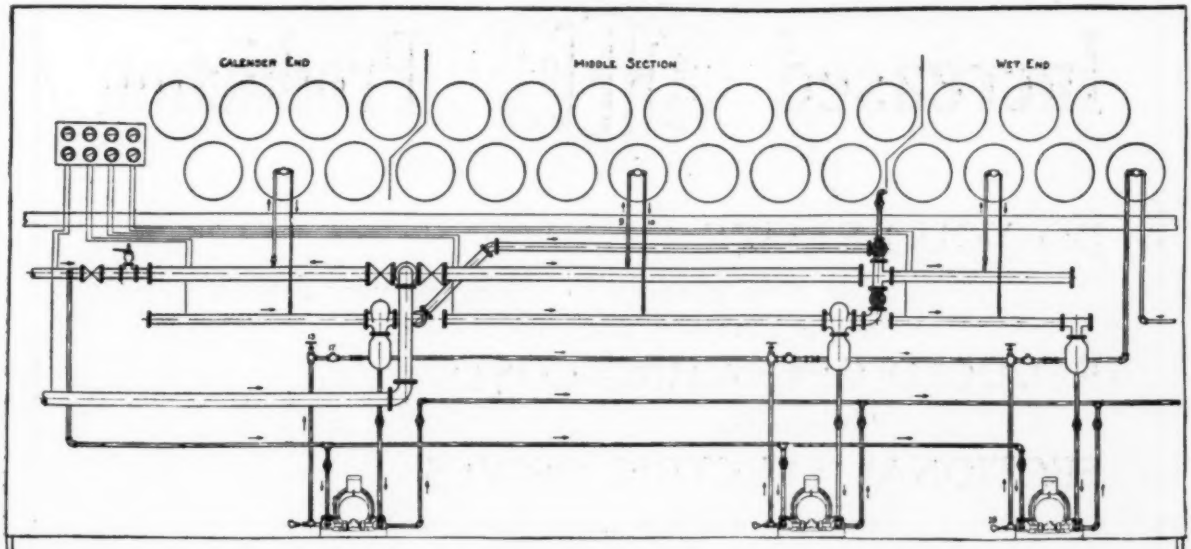
LINK-BELT

Avoid the Sudden Application of High Temperatures on Wet Paper



The Crane System of Circulation and Drainage Control (Patented).

Graduate the Temperature Throughout the Machine

The sudden application of high temperatures to the wet paper as it passes over the dryers has a decidedly weakening effect on the layers of cellulose fibers. The most noticeable result of this weakening is numerous "breaks" and an appreciable decrease in production.

The only way to eliminate these harmful effects is to graduate the temperatures throughout the machine in such a way that the coldest and wettest paper will be subjected to lower temperature than the partially dried sheet.

One of the features of the Crane System of Circulation and Drainage Control is an automatic graduation of temperatures from high at the calender end, to medium at the middle section, and low at the wet end.

The temperature thus graduated maintains the strength of the sheet and increases production.

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CHICAGO

WORKS: CHICAGO AND BRIDGEPORT

INDIANAPOLIS, DETROIT, CHICAGO, ROCKFORD, OSHKOSH, GRAND RAPIDS, DAVENPORT, DES MOINES, OMAHA, SIOUX CITY, MANKATO, ST. PAUL, MINNEAPOLIS, WINONA, DULUTH, FARGO, WATERTOWN, ABERDEEN, GREAT FALLS, BILLINGS, SPOKANE, SEATTLE, TACOMA, PORTLAND, POCATELLO, SALT LAKE CITY, OGDEN, RENO, SACRAMENTO, OAKLAND, SAN FRANCISCO, LOS ANGELES

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We are manufacturers of about 20,000 articles, including valves, pipe fittings and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes, and are distributors of pipe, heating and plumbing materials.

Increased HECo Production

DO YOU REALIZE

that it is possible to attain this very desirable result and at the same time obtain

REDUCED OPERATING COSTS

by installing

SECTIONAL ELECTRIC DRIVES

on your existing paper machines?

WHY?

BECAUSE Operating speeds can be increased 20 to 25%. Power consumption is reduced 40 to 50%. Belt cost is entirely eliminated. Improved Inter-Section-Speed-Control reduces the quantity of "BROKE" and improves the quality of the paper. Many other minor advantages are also obtainable.

The Harland Engineering Company of Canada, Ltd., will be pleased to send their Engineer to discuss these matters with you.

FINALLY Remember that the Harland Interlock Sectionalized Drive is the most simple and efficient Electric Drive on the market. Has only one motor per section. No belts employed to transmit power. Is free from complicated electrical mechanism.

Yours very truly,

The Harland Engineering Company of Canada, Ltd.
Montreal, Canada

Do not pass on until you have read this. It will only take 60 seconds of your time and may be worth thousands of dollars to you

"Good Will to Men"

MANY of the most prominent men of the great nations of the earth are now in conference in Washington, with the hope of devising some plan to diminish or abolish the tremendous cost of preparing for possible conflict with one another—to do away with war and to bring about "Peace on Earth, Good Will to Men."

The whole civilized world has its eyes focused on this momentous gathering, and every sane man in the world is hoping some good will come from it, for we all agree with the Psalmist, when he wrote "Behold, how good and how pleasant it is for brethren to dwell together in unity."

The one great obstacle to the success of all such gatherings is that neither nations, nor men realize the full meaning of "Good Will to Men." No nation wants war, but they all want what they want, irrespective of whether it is fair to other nations or not. They all want "Peace on Earth," but are not always ready to do those things which make for peace.

And so it is with men.

At this season of the year most of us become a little more tender, a little more considerate, a little more thoughtful of our fellow men, than during the rest of the year. We often hark back in our thoughts to our boyhood days. We can see those that are now gone gathered around the family hearth; we remember the Christmas tree, our belief in Santa Claus, the big dinner, and the many things we had to make us happy. Most of us also remember the things that we then longed for, and did not have, and most of us promised ourselves that when we became men, and had means to do it with, our greatest pleasure would be to help someone else at this season—to make someone else happy.

It is easy to make a destitute person or family happy, for this only means a few dollars, and dollars are not worth anything except as a means of doing good.

Ever since the Christian era began, "Peace on Earth, Good Will to Men" has been on men's lips at this season of the year. We meet our friends and acquaintances and salute them with a "Merry Christmas," but unless we have a "Good Will to Men" look in our eyes, and a "Peace on Earth" feeling in our hearts, it means little.

If all of us would strive every day to do to and think of others as we would have them do to and think of us, we would soon "put on the new man," and be able to say—

"Get thee behind the man that I am,
You man that I used to be."

And "Peace on Earth, Good Will to Men" would indeed be a fact.

Sheahan's Paper Carrier

(PATENTED)

Takes the Paper Automatically Through Dryers

Prevents Accidents *Saves Broke Paper* *No Missed Ends*
No Spearing Due to Missed Ends *No Shut Downs Due to Spearing*

ALL THESE INCREASE PRODUCTION

No Slack Paper On Dryers

Passes the paper at exact speed of dryers

Applicable to all kinds and makes of paper machines.

Following is a partial list of users. Please note the number of re-orders.

International Paper Co	11 re-orders	News Pulp & Paper Co., Canada	1
Paul A. Sorg	1	Fuji Paper Co., Japan	1
Sherman Paper Co	1	Sakai Celluloid Co., Japan	1
District of Columbia Paper Co	1	Brompton Pulp & Paper Co., Canada	1
Tidewater Paper Mills	2 re-orders	New York & Pennsylvania Co	1
Abitibi Power and Paper Co., Canada	7 re-orders	Crown Willamette Paper Co	1
Bryant Paper Co	1	Fitzdale Paper Co	2 re-orders
King Paper Co	1	Spanish River Pulp & Paper Co., Canada	1
Laurentide Paper Co., Canada	7 re-orders	Belgo-Canadian Pulp & Paper Co., Canada	2 re-orders
Finch Pruyn Co	1	St. Croix Paper Co., Canada	1
Wheelwright Paper Co	1	Fitchburg Paper Co	1
Wausau Sulphate Fibre Co	3 re-orders	Ontario Paper Co., Canada	1
Price Brothers, Ltd., Canada	2 re-orders		

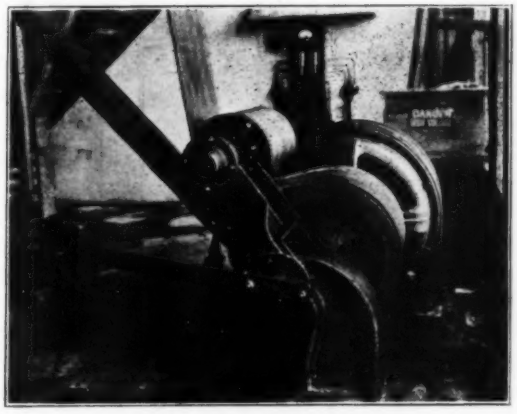
Send for Our Bulletin, "Dryer Group No. 11"

The Bagley and Sewall Company

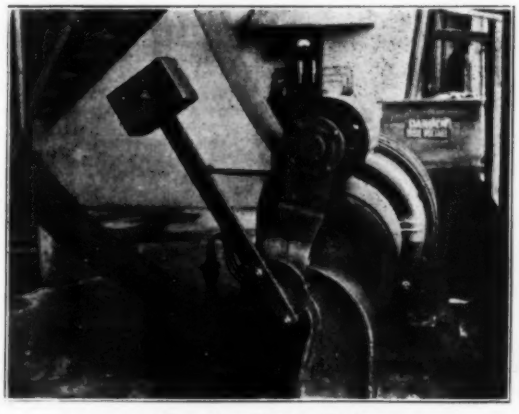
WATERTOWN, NEW YORK
U. S. A.

The LENIX BELT DRIVE
on PAPER MAKING MACHINES *is*

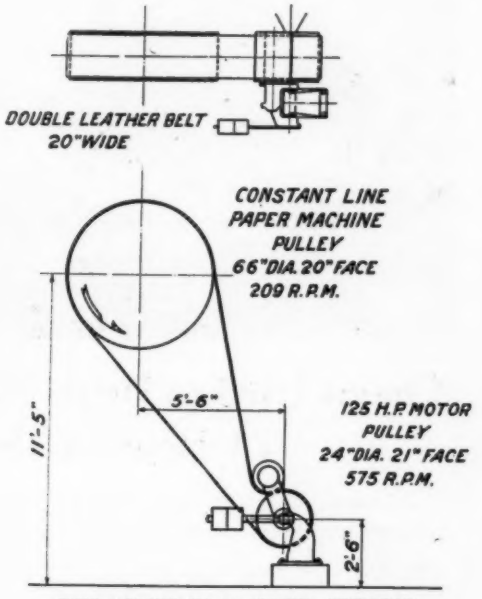
WRAPPING belts around 235° of pulley circumferences
SAVING POWER by avoiding slippage
SAVING SPACE by shortening pulley centers
SAVING in initial COSTS OF BELTS by shortening pulley centers
SAVING in belt WEAR by avoiding slippage and by "resting" the belt
SAVING in first COST OF MOTORS through using high speeds
MINIMIZING belt WORRIES



"Wrapping" the Belt



"Resting" the Belt



THE LENIX IN 24-HOUR SERVICE

There are thousands of
LENIX DRIVES
operating satisfactorily on vertical, horizontal and quarter turn drives

The Booklet
"SAVING SLIPPAGE AND SPACE"
is convincing. Ask us for it

F. L. SMIDTH & COMPANY, *Engineers*
50 CHURCH STREET, NEW YORK, N. Y.

The Sign of Efficiency

MORSE DRIVES

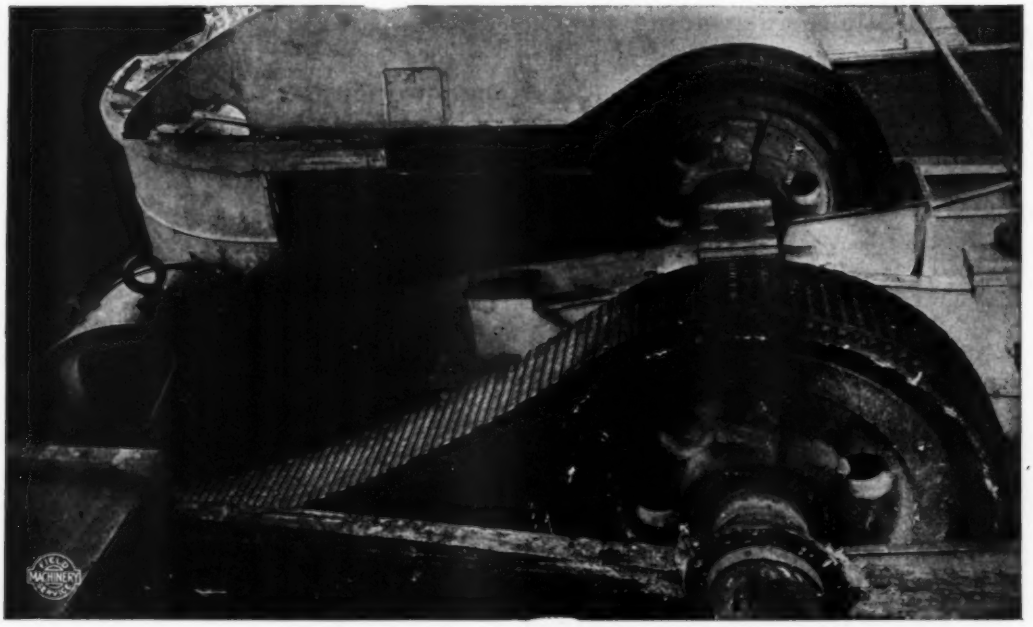
The Sign of Durability

THE MORSE "ROCKER JOINT"

Positive as Gears

Flexible as a Belt

Longer Life



Chains Used to Drive "Beaters" in a Paper Mill Work 24 Hours a Day, 6 Days Per Week

The Morse Chains shown are part of an installation in a large Eastern paper box factory, transmitting power from 150 H.P. Motors to the "beaters."

The driven sprockets in the illustration are of Shearing Pin construction. When the beater clogs the pins shear at a predetermined load and thus protect the beater, drive, bearings and motor. New pins are quickly and easily inserted and the drive started again.

Morse Chains are 99% efficient—silent, durable and economical to maintain. If your belts or gears are subjected to unusual conditions of wear and exposure or if you are losing production and increasing costs through belt slip, talk over the conditions with a Morse Engineer.

Our engineers are power transmission experts and will tell you frankly whether or not Morse Chain is the solution.

MORSE CHAIN CO., LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD **ITHACA, N. Y.**

Morse Engineering Service *Assistance Without Obligation*

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MINNEAPOLIS, MINN., 413 3rd St. S....Strong-Scott Mfg. Co.
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NEW YORK CITY.....50 Church St.
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ST. LOUIS, MO., Chemical Bldg.....Morse Engineering Co.

"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service

When Will the Parade Start?

FOR a long time the one big question in the minds of men of this country and the one query on their lips has been "When will business conditions get back to normal?" No one can answer this question, but every sign points to the fact that during the past few months great strides have been made in this direction.

Every writer and speaker of note has mentioned the fact that we had reached the bottom quite a long time ago, and that for some months we have been going up the hill again, back to the green pastures of normal conditions.

True, the road is rough and the hill steep, but if American brain and brawn work together harmoniously we shall soon be out of the mire, the chaos and "old night," and on the good road again.

Prices have been stabilizing. Commodities have come down in price—in a few, possibly, too low—but there is still room for much work along this line. It seems hard for some men to realize that the war is over, and this applies to workmen who were anxious to see their wages go up to a very high peak, and are now unwilling that they should recede, as well as to others who are still trying to grab off war profits.

The one great remedy for present ills is for American workmen, American manufacturers, American bankers, and American lawmakers, to apply themselves diligently, and with determination, to give America the best that is in them. This will be necessary for us to compete with the rest of the world, and if this is done, we can beat any nation on earth at any game.

Many of our best minds believe that if the conference at Washington successfully finishes its work, that this will give a tremendous impetus to business conditions in this country.

In this industry, the improvement during the past few months has been great. Many mills that were idle or only working short time, are now filled with orders and running full time. All this along with the fact that paper merchants have not been buying a pound that was not needed. Their shelves are practically bare. Most of them have been taking inventory during the first part of December, and this will be repeated at the first of the year. This should mean the placing of a heavy tonnage with the mills soon after the first of January, or before.

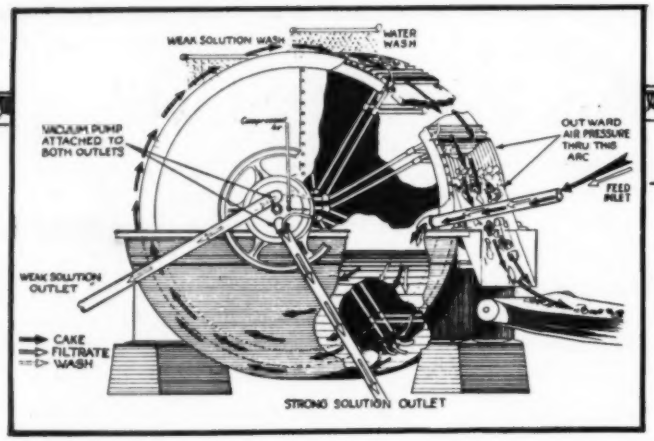
Prices have made one advance in wrapping papers, which was necessitated from the fact that considerable was sold at less than cost of production. Another advance may become necessary soon.

There has been a wonderful improvement in conditions with the news print mills. In a report sent out by the News Print Service Bureau on November 15, it was shown that with the forty-four companies reporting to the Bureau, from this country and Canada, these mills produced 156,844 tons and shipped 165,365 tons during October, shipping 8521 tons more than was manufactured. Also that the daily average production for these mills for October was 77.5% of the average daily output during the three months of greatest production during 1920.

The report also shows that the production during October was 9% and shipments 16% greater than in September; that the production during the first ten months of 1921 was 24% less than the first ten months of 1920 for the United States mills, and 18.5% less for the Canadian mills. So while the decrease for the first ten months in 1921 was an average of more than 20%, the increase in October over September was about 12%.

When will the parade start? It has already started, and if each and every one of us will put our shoulder to the wheel and give a good hard push, and then another, it will not be long before we will be on high, dry and level ground again.

There is no room for idlers, loafers or slackers in America to-day, any more than there was during the war.



HOW *the* OLIVER Operates

Follow the arrows and you will realize the simplicity of the Oliver Continuous Filter.

The material to be filtered flows in at the feed inlet, keeping the tank full. As the drum slowly revolves, vacuum is applied through interior piping to the individual sections, thus drawing the filtrate through the filtering medium and building up a cake on the outside of the submerged arc.

As this cake emerges from the tank, it is washed and dried under suction until the outward pressure arc is reached. At this point the automatic valve cuts off the vacuum and allows the compressed air to blow the cake off onto a scraper, thus cleansing the cloth. Wire windings protect the filtering medium from contact with the scraper.

Oliver Filters are successfully washing either Soda or Sulphate pulp direct from the digesters. Thus the Oliver separates the black liquor from the stock at the earliest possible moment while still hot and when complete separation is most easily made.

Oliver Filters save money because they eliminate waste and reduce operation costs. It pays to install Olivers, even though it involves the scrapping of much old style equipment.

Write us about your filtering problems and let our experts demonstrate to you how the Oliver Filter will solve them. Our catalogue and complete information on request.

OTHER OLIVER PRODUCTS

Oliver Vacuum Pumps
Oliver Air Compressors
Oliver Centrifugal Pumps
Oliver Worm Gear Speed Reducers
Olivite Acid Proof Centrifugal Pumps.

Oliver *Continuous* Filter Co.

San Francisco
503 Market St.

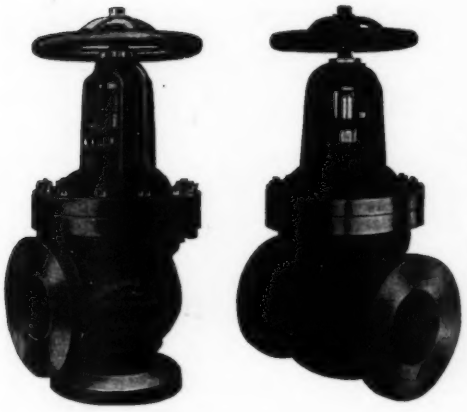
New York
33 W. 42nd St.

London
11-13 Southampton Row, W. C.

The Valves that Safeguard "Life and Property"

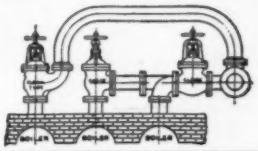
GOLDEN-ANDERSON

Patent Automatic Double-Cushioned Triple-Acting and Non-Return Valves

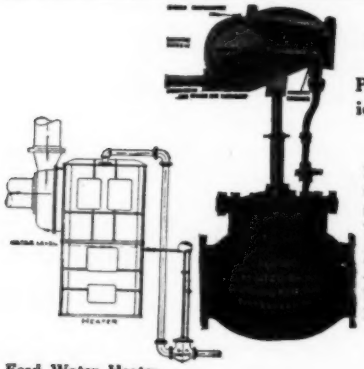


1st. **Prevent expensive shut-downs**—Automatically close in case of boiler or steam line ruptures.
2nd. **Make back flow of steam impossible.**
3rd. **Equalize pressure** between boilers, automatically—quickly pay for themselves in reduced coal bills alone.
4th. **Absolutely protect men inside of "dead" boilers.**
5th. **Valves fitted** with "Double Corliss" dashpots. Absolutely cushion valve—no hammering or sticking.
6th. **Provide for every contingency** by "automatic" testing in service feature—valves closed from floor to remote points.
7th. **Heaviest and most correct** mechanically constructed and operated automatic valve made.

Also made in plain non-return style for protecting the boilers only. Angle, globe and elbow pattern.



4,100 Ordered by Iron and Steel Companies "No shut-down when a tube bursts"



Feed Water Heater

Golden-Anderson

Patent Automatic Cushioned Controlling Float Valves

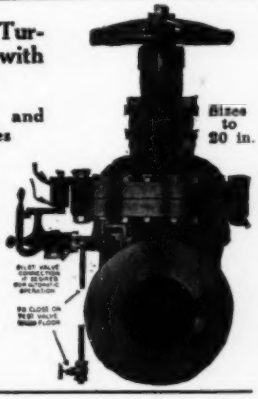
Especially Adapted for Maintaining Uniform Water Level in Feed Water Heaters, Tanks, Reservoirs, Vats, etc.

No Water Waste—Economic—Durable—Reliable—Air and Water Cushioned—Virtually Indestructible.

Sizes to 24"

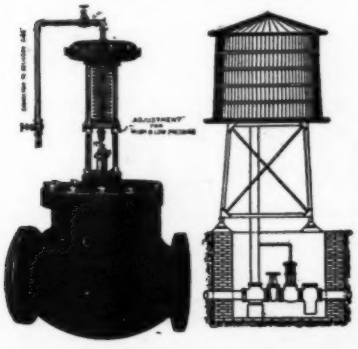
Makes Your Engines and Turbines Safe from Racing with Golden-Anderson Pat.

Cushioned Combined Throttle and Automatic Engine Stop Valves



Sizes to 20 in.

1. Pressing an electric button or opening a small hand valve from any distant point will instantly trip the valve.
2. Can be easily connected to close automatically the instant engine over-speeds by means of mechanical or electrical grip attachment. Disaster is therefore averted from this cause.
3. Cushioned by a double Corliss Dash Pot that makes banging, chattering and sticking impossible.
4. Contain no tight-fitting parts. Supremely simple in design throughout.
5. Double extra strong in construction and virtually indestructible.



Golden - Anderson Pat. Automatic Cushioned Controlling Altitude Valves

They stop all water waste down the overflows of reservoirs, standpipes, tanks, etc., by automatically maintaining the water level constant at the desired level. They operate without floats or fixtures.

Three ways of closing:
1. By water.
2. By electricity, from distant points.
3. By hand.

Sizes to 24"

Golden-Anderson

Automatic Cushioned Steam Pressure Reducing Valves

XX Extra Heavy "For High or Low Pressure Service."

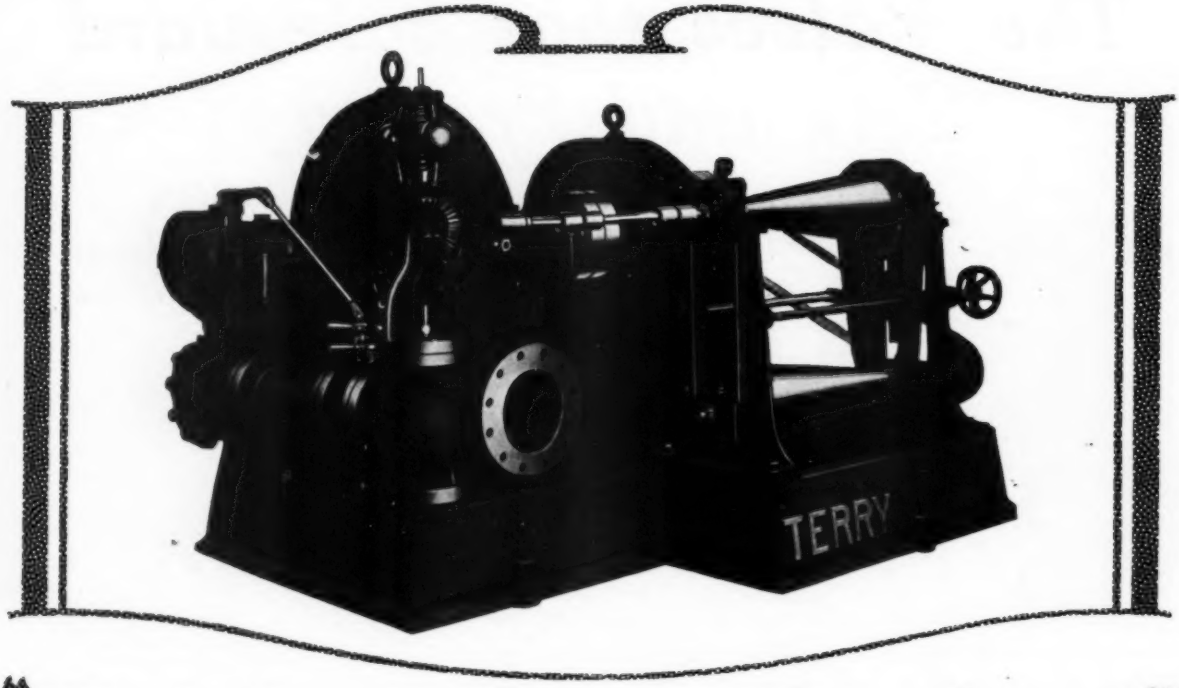
Embody the elements of simplicity, strength and reliability. Positive in action and always ready for service. Set valve to deliver high steam or other pressure at any reduced pressure and its action thereafter is entirely automatic. Nothing to break, stick or require attention. Perfectly cushioned when opening and closing and operates without noise. Will stand the wear and tear of years without repairs.

The very simple, correct, mechanical construction and operation insure a constant terminal pressure regardless of any fluctuation in the initial pressure.

Valves furnished cast iron, semi-steel or cast steel for all pressures.

Golden-Anderson Valve Specialty Co.

1293 Fulton Bldg., Pittsburgh, Pa.



"Variation in Speeds *from* 6 to 1"

THE steam turbine has been recognized as an ideal drive for paper machines which turn out only one grade and weight of paper because of its uniform and constant rotary speed (with variations of less than 1%), its dependability with attendant freedom from upkeep cost and repairs and, most important of all, because of its clean exhaust. The drying rolls are, therefore, kept free from oil and operating at their utmost efficiency.

The advent of the new Terry unit, with its variable speed governor, now makes the turbine applicable to paper machines producing various grades and weights of stock. A constant speed of 300 R. P. M. or 1800 R. P. M., or any intervening speed, may be held with but slight variation.

Write for Bulletin 25-I on the Terry turbine and gears and special references on the variable speed drive.

T-754

THE TERRY TURBINE

Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

Business Sense

By IKE KENNEDY

Success

WHEN the lives of all great characters in history are analyzed, it will be found that the outstanding virtues that have made their dreams a realization, are modesty, vision, faith, an insatiable desire for knowledge, and a capacity for great labor inspired by lofty ideas.

The great Lincoln, that shining mark of inspiration for all American manhood, dreamed his simple dreams of boyhood, even as you and I. Dreamed his dreams of manhood from the songs of forest and stream, from the plowed furrow, and from the simple teachings of a sainted mother. He was, all in all, the perfect type of humbleness exalted through the trials of adversity; with self-denial, knowledge and modesty as his guiding stars.

There is not a man in your acquaintance who has not at his command greater opportunities for rising to any coveted goal than had this poor rail splitter. It would be impossible for you to walk ten blocks in any American city without having thrust upon you a thousand means of knowledge and opportunity that were denied your fathers. "The fault, dear Brutus, lies not in our stars, but in ourselves that we are underlings."

If every man would treat his mind with half the consideration he would give the motive power of his automobile, there would be no limit to his power.

If he could only have a little brain garage where he could get down under the machine and remove the carbon of indifference and imaginary impediments; if he could only touch up the spark plugs of his imagination—oh, what a difference! If he could only use one hour a day in his general overhauling, imagine the speed he could generate! Can you imagine any hill he wouldn't take "on high"?

We are created in the image of God, endowed with all the energy of a buzz-saw in motion, if we will only steam up the old engine of ambition and enthusiasm. We are veritable waves of force and power, capable of wiping out any bulkhead of opposition.

We will not attempt to analyze the success of the various big men who have come and gone. But one question need be answered and we will have their analysis. Did they get understanding? If they got it, then it is not necessary to ask if they applied it, for they could not hold it back if they would, and would not if they could, because it is the most pleasurable and profitable thing in the world to use. It is irresistible—it will not be submerged. It is the lever that lays waste the mountain and pries the lid from every strong box.

Follow that occupation which most appeals to your imagination. Each of us has implanted in him some special gift. Successful men will admit to you that they attribute their success to doing things that most appealed to them. Yet you will scarcely ever find a successful man who can analyze his own success. No history has ever given us the details or formula of success; but it is a good wager that knowledge, and love for knowledge, and the fun of cashing it in, has brought bigger returns than hard, aimless plodding. If your talent is salesmanship, develop the talent, and sell yourself first.

The boy who tramps miles to the nearest mill pond and sits all day in the blazing sun and returns at night triumphant with a slender string of "goggle eyes," has worked, but it has never been labeled as such. His sole object has been gained. He got what he went after, and is as much a success as any builder of great fortunes.

The things we think are but the things we do. If we think big thoughts, we have paved the way for big deeds. If we attempt big things and fail, that part of our effort which has been performed has not been lost; it remains as a guiding star for others to follow in the blazed trail of our undeveloped opportunity.

The man who takes up the unfinished task of the pioneer, tries and puts his heart in it and follows it through, has only added the element of success which it originally lacked.

Misfortune has made fortunes. Hardships have created ease. Warfare has given us peace. Disaster has brought us greatest reforms. Competition which has always arisen like a grim spectre at the beginning of any enterprise, has usually proven itself to be its greatest benefactor. Opposition is but the test of man's indurance. Failure can never be writen until we ourselves have written it. The measure of all success is well directed effort, and all well directed effort means careful, consistent thinking. Thinking means planning, and building must follow planning, else your dream will never be shaped into a reality.

Then what is your dream? What would you attain? What price will you pay? What lessons will you learn from the past? What is your goal?

There is but one lamp to light you on your darkened way—the lamp of KNOWLEDGE—the only thing you cannot borrow from a kindly neighbor.

Success is but a Dream come true,
A firm resolve to see it through,
A goal affixed, a shining light,
A will to do with all our might.

White Truck owned by the Mississippi Valley Paper Company, of St. Louis

Meet Every Requirement of the Paper Industry

THE Mississippi Valley Paper Company, of St. Louis, has found from experience that White Trucks provide a transportation service that is highly dependable. The company's White has given uninterrupted service for two years, hauling capacity loads of paper.

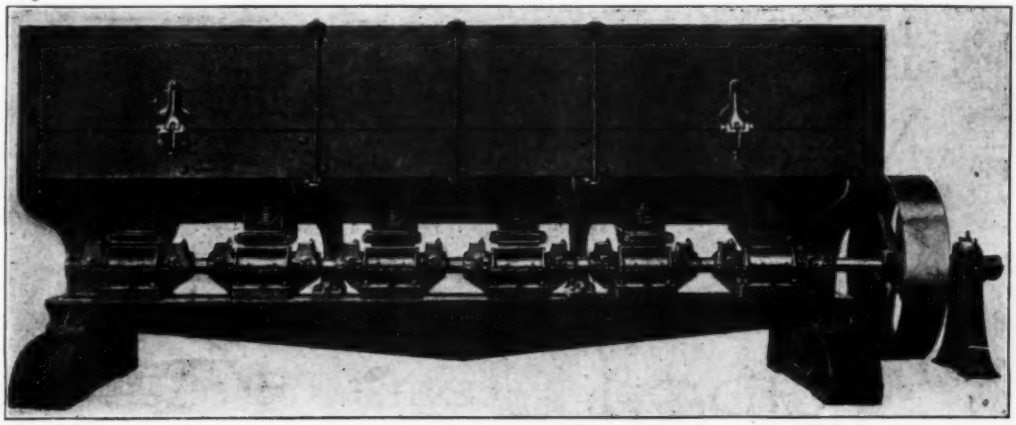
"Our White meets all of our requirements at a remarkably small expense," says Mr. I. McCarty, Superintendent. "It is giving such excellent service that we look forward to the purchase of another White when we increase our delivery equipment."

Many leading paper companies in every part of the country have standardized on White Trucks. They know from experience that White Trucks give economical and dependable service, day in and day out, over a long period of years—that their earning power, even after traveling 100,000 to 300,000 miles, is unimpaired.

THE WHITE COMPANY
CLEVELAND

White Trucks

Pulp and Paper Mill Machinery



FLAT SCREENS
Made in All Sizes from 6 to 18 Plates Inclusive

Grinders

Three and Four Pockets

Equipped with **all Latest Devices** including our **Patented Pulp Scraper between the pockets.**

Inquiries Solicited

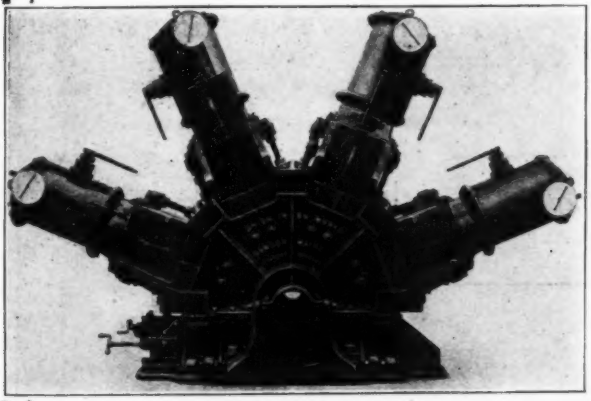
Chippers

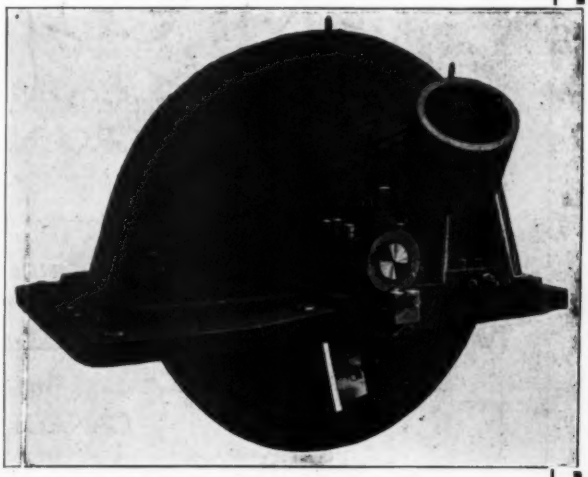
Made in 48", 84" and 90" sizes, right or left hand; three or four knives.

The 48" chipper is intended for small wood or slabs.

Our patented improvements make the production of clean, evenly cut chips, free from slivers, possible.

Description on request





We also manufacture Cylinder Molds, Wet Machines, Barkers, Pumps, Iron, Brass, Bronze and Lead Castings

Union Iron Works, Bangor, Maine

IMPROVED PAPER MACHINERY CO.

NASHUA, NEW HAMPSHIRE, U. S. A.

"IMPCO" CENTRIFUGAL SCREEN
Over 500 in daily use

"IMPCO" KNOTTER [for first screening]
Over 400 in use on all kinds of stock

"IMPCO" TAILING SCREENER
50 sold this year

"IMPCO" REFINER
New---Just introduced

Together Make our Closed System
for GROUND WOOD *Pulp*

We develop our own machinery, know how to build it and make it give real results in your mill----Correspondence a pleasure

CANADIAN FACTORY
SHERBROOKE MACHINERY COMPANY, LIMITED
SHERBROOKE, QUEBEC

CONTEST WINNERS NOT YET CHOSEN

E REGRET that we are not yet able to announce the names of the winners in the Contest conducted by The Paper Industry during the year ending September 30, 1921. We had hoped that this could have been done by no later than the date of publication of this December issue, as we understand fully the desirability on the part of the winners to have their rewards granted to them at this time when everyone likes to be beneficent, and generally is so to the extent of their purse.

However, the selection of the articles which contained the most constructive ideas and considered the most valuable to the industry is no easy task, out of a total of forty-one accepted papers treating of nearly as many diverse subjects.

The four judges chosen by The Paper Industry to serve in this work are men for whom the industry has great respect, not only for their ability as successful and progressive papermakers but also for their integrity, which immediately puts the stamp of fairness on their selection of the winners.

These men are busy builders in the paper industry and have very little time at their disposal. They have agreed to act as judges in this Contest out of pure love for the work and the good of the industry. They have spent but a few weeks in reading over the papers and trying to decide on the winners, and the time has not been sufficient to allow them to arrive at a full conclusion.

We feel that it is not improper at this time to announce their names, and we therefore take pleasure in doing so.

D. C. EVEREST, secretary and general manager, Marathon Paper Mills Company, Rothschild, Wisconsin.
GEORGE CARRUTHERS, president and general manager, Interlake Tissue Mills Company, Ltd., Merritton, Ontario, Canada.
DR. OTTO KRESS, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wisconsin.
G. S. WITHAM, JR., general superintendent, Union Bag and Paper Corporation, Hudson Falls, New York.

We sincerely hope that a complete announcement of the Contest winners can be published in our January number.

THE PAPER INDUSTRY

Oxford Paper Company

Mills at
RUMFORD
MAINE

Executive Offices
200 Fifth Avenue
NEW YORK

Manufacturers of

High Grade Machine Finish and Super-Calendered Book Papers

CAPACITY OF MILL, 300 TONS OF PAPER PER DAY

Nashwaak Pulp & Paper Co. Limited

Manufacturers of

P

Canadian Bleached Sulphite

Mills: St. John, N. B., Canada

GENERAL SALES OFFICE
200 Fifth Avenue NEW YORK

Maine Coated Paper Co.

Manufacturers of

Polar, Hi-Tone and North Star Coated Book Papers

ALSO

Coated One or Two Sides Lithograph and Cover

Mills: Rumford, Maine

New York Sales Office: 200 FIFTH AVE.

POLAND PAPER COMPANY

MANUFACTURERS

BOND, LEDGER, WRITING, ENVELOPE, STRONG BOOK, COATING PAPERS

BLEACHED SULPHITE SPECIALTIES

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Mills at
MECHANIC FALLS, MAINE

60 Tons
DAILY CAPACITY

Service that means 100% Satisfaction

The B Co INC

PULP

Among our well-known brands are:

"Bear" "Forshaga" — BLEACHED SULPHITE

"K-1" — EASY BLEACHING SULPHITE

"Hurum" "Bamble" — STRONG KRAFT and BLEACHABLE SULPHATE

The BORREGAARD COMPANY, Inc.
200 FIFTH AVENUE - - NEW YORK CITY

Quality—it means more than price

To Save Time

SCORING IN CALENDER ROLLS CAUSED BY DOCTORS OR PLUGGING

SPEEDILY REMOVED BY A FARREL ROUGHING GRINDER

If your calender rolls are scored by the doctors or by plugging it takes some time to remove these scores on a finishing grinder.

We therefore recommend to you as an economic measure the purchase of a Farrel Roughing Grinder.

This grinder is the same machine as the Farrel finishing grinder, which you may have now in your Plant. But it is built much heavier throughout with larger motors and emery wheels—and it is not built for crowning, which should be done on the finishing machine.

Speed and **accuracy** are what we have aimed at in making a roughing grinder for our own use and we have succeeded in combining these two necessary factors.

Because the Farrel roughing grinder is built on the same principle as the finishing machine, with two emery wheels on a swing-rest and fitted to grind rolls on the bearings instead of on centers, the rougher turns out accurate work, while at the same time it is removing stock **six or seven times** faster than the finisher.

If your Plant is large enough to warrant keeping two grinders at work on your rolls, you will be saving money by having one of them a Farrel Roughing Grinder.

FARREL

Established 1848

Foundry & Machine Company
Ansonia, Conn.

Branch Plant:
Buffalo, N. Y.

Sturtevant

REG. U.S. PAT. OFF.

PUTS AIR TO WORK

General view of machine room showing one of the largest board machines installed in a modern mill. The Sturtevant Vapor Absorption System is clearly seen, while the pipe for the roof can just be distinguished in the upper right-hand corner of the photograph.

Drying on board machines is one problem solved by Sturtevant engineers. The following products have also been successfully dried—wall-board, beaver-board, leather-board, gypsum-board, pulp-board, wood chips, sawdust, wood flour, coated paper, wall paper, gummed paper, sand paper.

Submit your problems to us or the J. O. Ross Engineering Corporation of New York

B. F. STURTEVANT COMPANY

HYDE PARK **BOSTON, MASS.**

Sales Engineering Offices Located in

ATLANTA
BOSTON
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CHICAGO
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CLEVELAND
DALLAS
DETROIT
HARTFORD
KANSAS CITY
LOS ANGELES
MINNEAPOLIS
NEW YORK
PHILADELPHIA
PITTSBURGH
ROCHESTER
ST. LOUIS
SALT LAKE CITY
SAN FRANCISCO
SEATTLE
WASHINGTON
GALT and
TORONTO, ONT.
MONTREAL

PITTSBURGH PIPING FOR POWER PLANTS

Worth thinking about

Your piping is no less important than your Prime Mover and should be given the same thought and attention when you contemplate building your Power Plant.

Your piping in connection with Water-softening and Filtering Units—Evaporators, Conveyors and other machinery for Paper Mills are just as important. Each are essential for the efficient and economical operation of the plant.

Specify "Pittsburgh Piping" and you mention the best there is in Power Piping construction.

PITTSBURGH PIPING & EQUIPMENT CO.

MANUFACTURERS AND CONTRACTORS

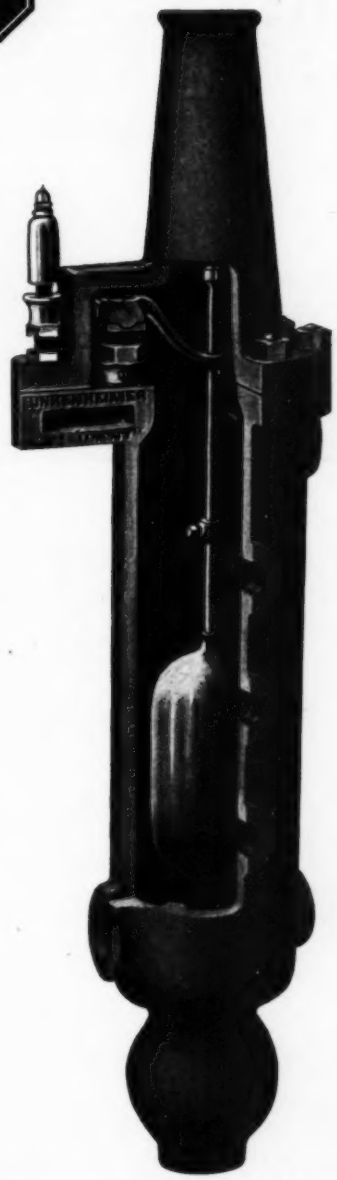
PITTSBURGH, PA.

New York, 120 Broadway | Cleveland, Amer. Trust Bldg. | Chicago, Peoples Gas Bldg. | Indianapolis, Trac. Term. Bldg. | San Francisco, Monadnock Bldg. | Birmingham, Amer. Trust Bldg.

"WHEN YOU THINK OF PIPING, THINK OF PITTSBURGH PIPING"

LUNKENHEIMER

"Vigilant" Safety Water Column



A *safety appliance* necessary for protection against the dangers incident to high and low water levels in steam boilers.

THE "VIGILANT" SAFETY WATER COLUMN will automatically sound an alarm and notify the attendant whenever the water level approaches either danger limit. It thereby safeguards life and protects the boiler from serious disaster which may be caused by the low level allowing the fire to play on the crown sheets and tubes when unprotected, or extreme high level which causes priming of the boiler and consequent damage to the power unit and the connecting pipes and valves.

The action of the "VIGILANT" operating mechanism is simple but positive. The single float actuates the double acting valve through the medium of stops set for high and low level limits. When the water approaches either danger limit the valve is opened, permitting steam to pass and blow the signal whistle.

A sediment chamber is provided at the bottom to trap scale or dirt which may enter the Column; Gauge Cock connections are tapped on both sides to permit right or left hand assembly; the top is removable for inspection of working parts, and all parts are renewable.

The "VIGILANT" Safety Water Column is recommended for working steam pressures up to 250 pounds; is made in a variety of sizes to suit all makes of boilers, and from the extensive line of LUNKENHEIMER Water Gauges and Gauge Cocks available a combination can be selected to suit every individual installation.

Specify LUNKENHEIMER "VIGILANT" Safety Water Columns and insist on getting what you specify.

THE LUNKENHEIMER CO.

"QUALITY"

LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD

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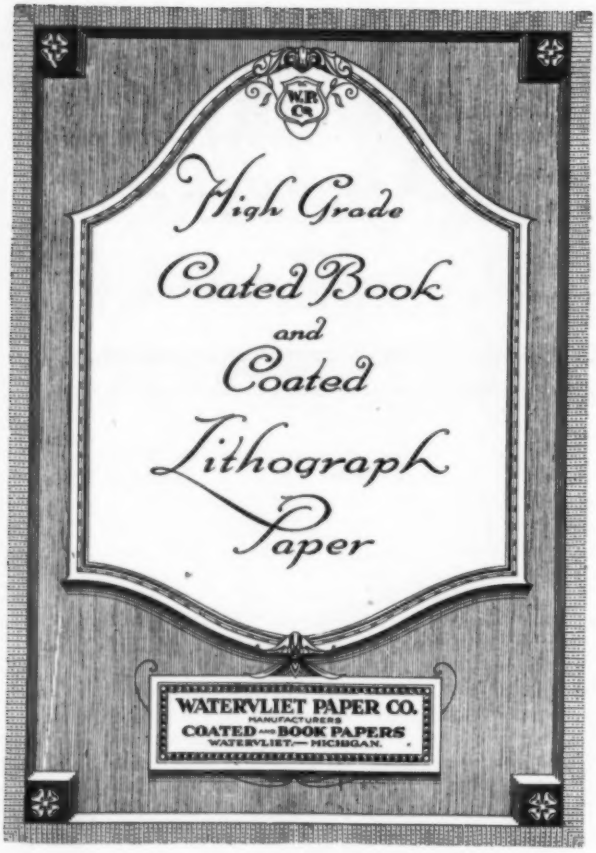

"World's Model Paper Mill"
KVP
Kalamazoo Vegetable Parchment Co.
Kalamazoo, Michigan, U. S. A.

Yours for Bigger and Better Business—

KVP

GENUINE VEGETABLE PARCHMENT
PURE WHITE WAXED PAPER
BOND---WHITE AND SIX COLORS
MANIFOLD---SUBSTANCE 8 AND 1

MUNISING PAPER COMPANY

MUNISING MICHIGAN

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COLOR QUALITY AND UNIFORMITY
HAVE MADE FOR IT
AN ENVIABLE REPUTATION

Marathon Paper Mills Co.

Rothschild—Wisconsin

Paper Manufacturers

Carton and Paper Can Stock

Sulphite Bonds
Waxing Papers
Bleached-Specialties

Machine Glazed Plain and Watermarked Specialties

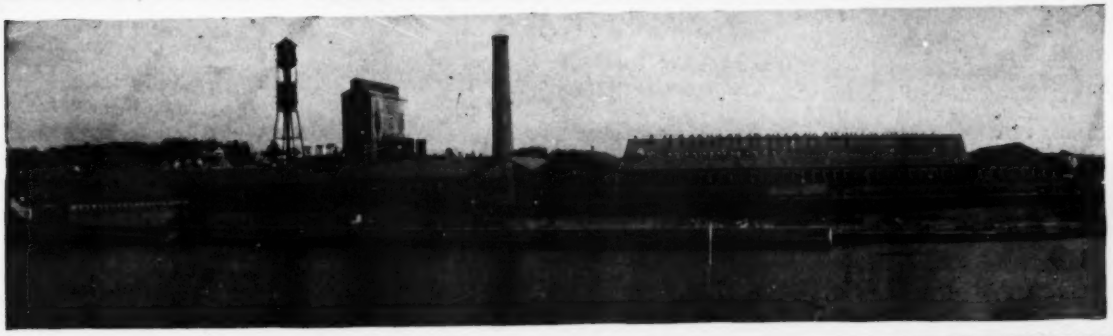
¶ One 100-inch Cylinder Machine, producing Solid Manilas, Single Lined and Double Lined Boards for Carton and Paper Can purposes.

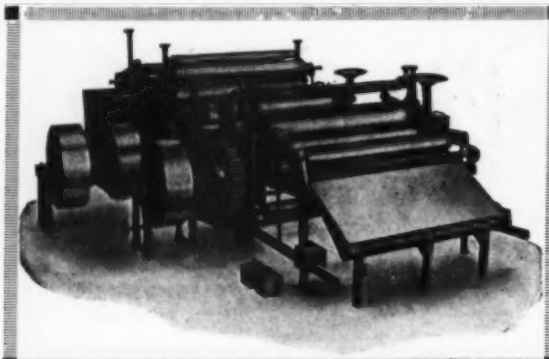
¶ One 120-inch Fourdrinier Machine, producing Sulphite Bond, and Bleached Papers for special conversions purposes.

¶ Two 120-inch Yankee Machines, producing Machine Glazed Papers in Plain and Special Stock Designs, as well as Special Watermarks.

Daily Production, 200,000 lbs.

SALES OFFICE
CONWAY BUILDING,
CHICAGO





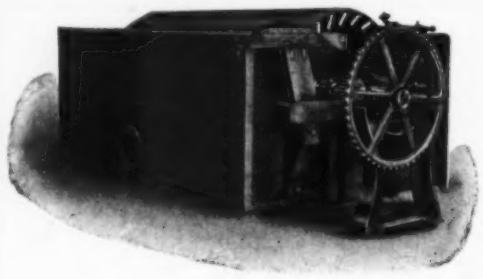
Rogers and Special Wet Machines

SINGLE AND DOUBLE PRESS
FOR CONVERTING CHEMICAL PULP INTO SHEETS 48% DRY

25-30 TONS air-dry pulp per 24 hours. Built in 72" width only, with patented pulp weakening and separating device or our new automatic knife cut-off attachment.

FREIGHT CHARGES are greatly reduced. Savings on this item alone often pay for the machine in one year.

110 Machines Now in Use. 28 Sold the Past Year



The Wood's Machine

Used as Pulp Thickeners, Savealls, Pulp Washers and Water Filters

ADVANTAGES:

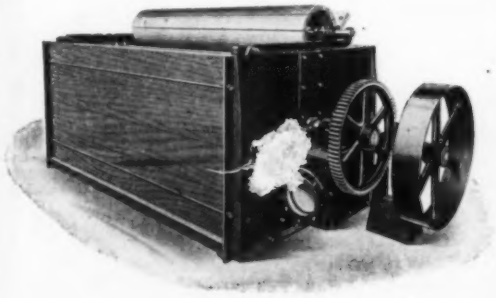
Reduced Wire Costs	No Couch Roll
Enormous Capacity	Minimum Repairs
Only 2 H. P. Required	No Doctor
Works Automatically	Requires No Attention

TWENTY-NINE SOLD DURING THE PAST YEAR

Wells Undulating Knot and Sliver Screen

Will bear closest investigation from every angle. It separates knots and slivers from all kinds of pulp efficiently, continuously, automatically with negligible cost for operation and upkeep. Simple but rigid construction. Only best materials used. Operation in plain view.

60 TONS DAILY CAPACITY, STANDARD SIZE. WRITE FOR BLUEPRINT AND FURTHER INFORMATION



Improved Decker

Single or Double Cylinder Type

Built in the following sizes:

Cylinder mould diameter, 36" or 40".

Face of cylinder mould, 72", 84" or 96".

Cylinder mould of best reinforced construction and properly supported with our latest design outside bearings.

Vat furnished either all wood or with cast-iron ends.

For Stability and Efficiency our Improved Deckers are Unexcelled

PULP AND PAPER MILL MACHINERY

GLENS FALLS MACHINE WORKS

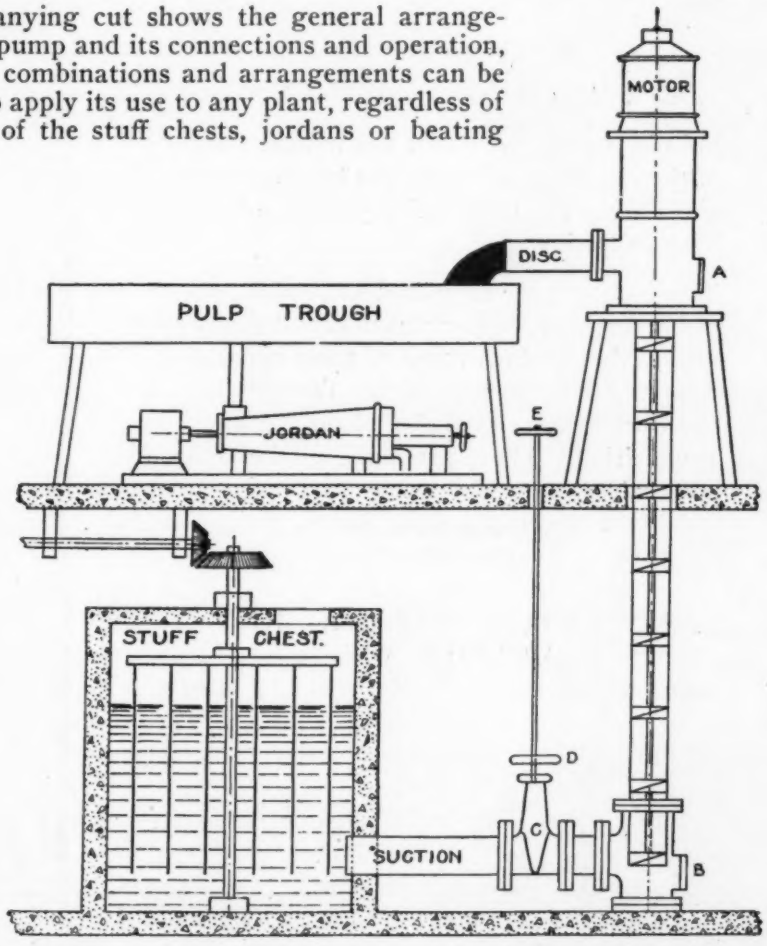
GLENS FALLS, NEW YORK

GREGG

Paper Mill Propellor Stuff Pump

This is a vertical rotary type of pump and does not contain any valves or contracted passages, or chambers for the stock to lodge in and is absolutely reliable and dependable in every way and superior to any type of stock pump heretofore used by the paper trade.

The accompanying cut shows the general arrangement of this pump and its connections and operation, but different combinations and arrangements can be made so as to apply its use to any plant, regardless of the location of the stuff chests, jordans or beating engines.



The capacity of this pump can be regulated by the gate valve in the suction line; this makes it a very flexible and easily handled pump. The action of the propellors keeps the stock broken up and agitated while on its passage through the pump, so that heavy stock or stock with pieces of metal, rope or sticks in same can be handled with safety. For examination or in cleaning the pump the hand hole plates "A" & "B" can be removed and a stream of water turned in opening "A" and the pump washed out thoroughly in a few moments and placed in service again.

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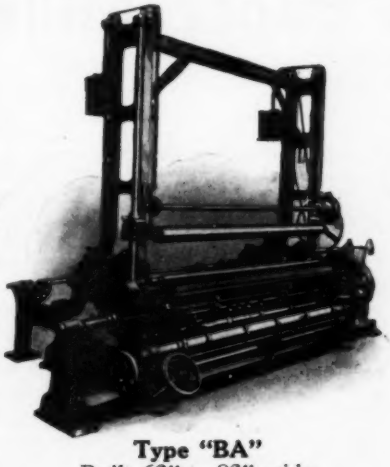

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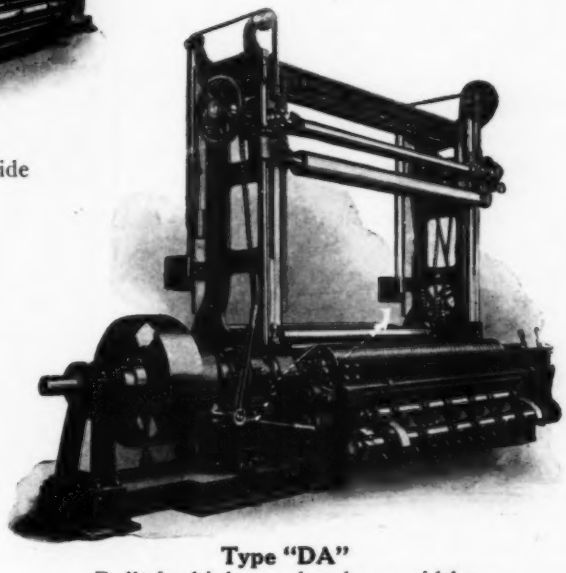

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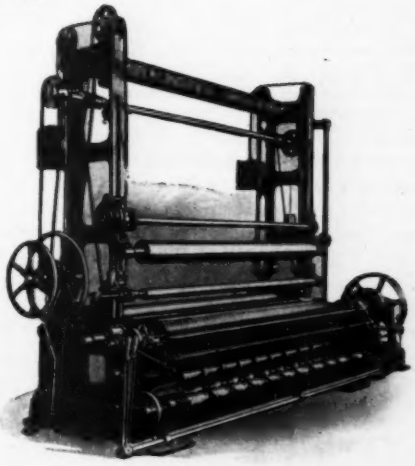

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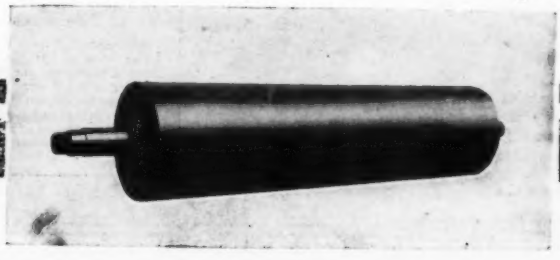

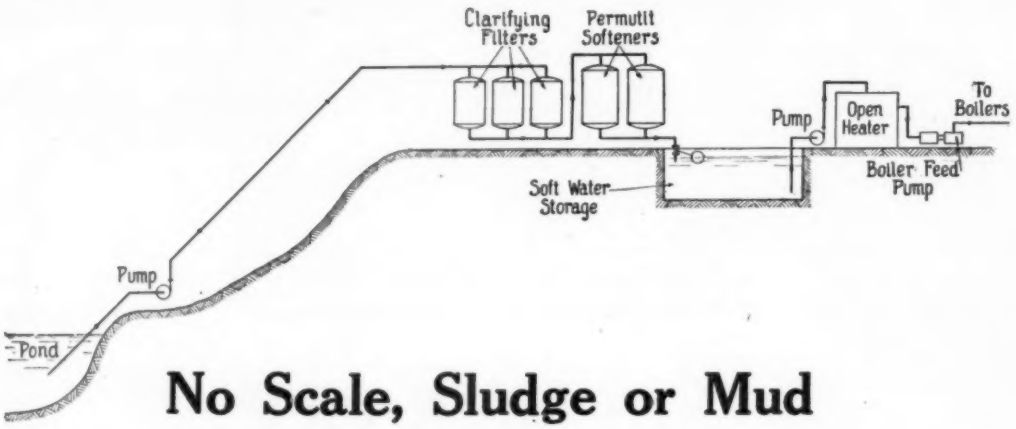

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In 1919, after a very searching examination of every water softening system on the market, they installed Permutit Zeolite Water Softening Apparatus, that delivers 201,600 gallons of zero soft water in 24 hours.

All boilers and auxiliary apparatus are now absolutely clean and free from scale. A saving of 25% of boiler plant labor has been effected, the cost of repair parts and replacements has been considerably reduced, and much fuel has been saved. A recent report from the General Superintendent stated: "We have had no difficulty due to the necessity of shutting down boilers on account of scale troubles. The boilers, which were clean at the time your plant was put into operation, have remained clean during this period, which is something in excess of a year and a half."

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Some Economical Aspects of Combined Sulphate and Sulphite Operation

By WALTER CLIFFORD, CH. E.; ASSOC. M., A. M. S. E.
General Superintendent, Hummel-Ross Fibre Corporation, Hopewell, Va.

I THINK every sound thinking man realizes that the inflated prices of paper and pulp products of the last two or three years are gone, perhaps never to return during the lives of the men who are responsible for "carrying on" in the paper and pulp industry, and it is a generally recognized fact that we are in for a period of severe competition where it is a case of the survival of the fittest, and that the profits of today, and for some time in the future, will be derived from what can be clipped off from the cost of manufacture. In other words, the mills that are in a position to cut cost of production to a minimum are the ones who are going to make what little profit is to be made. This being the case, it would be well to consider how cost of production can be diminished, and what steps should be taken to diminish it. The mills in which a sulphate and sulphite operation are carried on at the same time are in a specially favorable position from this point of view, because there are certain economies which can be attained in their combined operations which are well worth considering.

Economies in Lumbering Operations

By combining two operations in the way to be outlined great economies can be effected in the lumbering operations. In several parts of Canada wood suitable for the manufacture of sulphite, spruce and hemlock, grows with a large percentage of jack pine, poplar, and other woods. In a combined sulphate and sulphite operation, these woods can all be cut at the same time, and sent to the mill together, to be there sorted; the hemlock and spruce going to the sulphite mill, the jack pine to the sulphate mill for long fibred pulp, and poplar and other short fibred woods for short fibred pulp, or as a substitute for soda pulp. In this way great economies can be effected, because when a tract of land is being cut over, all the wood of suitable size for pulp can be cut at the one time, thus eliminating the expense of two operations. Also, the cull wood from the sulphite process and other wood unsuitable for making first class sulphite, such as slabs and edgings, can all be successfully pulped by the sulphate process, thus eliminating another source of waste.

Economy in Use of Chemicals

Perhaps even a greater economy can be effected than that in the wood operations, in the use of chemicals. A number of experiments have been conducted and all authorities agree that pulp cooked by the sulphite process, using soda as a base instead of lime will bleach far more easily and is of better quality than where lime is used as a base. The economy effected in bleaching is very great indeed, as spruce cooked by the sulphite process using lime as a base usually requires about 14% to 16% of bleach; when cooked by the sulphite process and soda is used as a base, the amount of bleach required is around 8%. These savings also apply in the case of hemlock and balsam, hemlock requiring normally around 17% to 18% on the sulphite process and when cooked with soda as a base around 10%. So it will be seen that the saving in bleach alone is considerable. In addition to these savings, the operation is much simplified, as delays due to "liming" of pipes and all the other troubles caused by lime, with which every sulphite superintendent is familiar, are absolutely elimmaximum production. The objection to using soda as a base has been that its cost was so much greater than that of lime, that this additional cost outbalanced any possible economies; so the attention of the writer was directed towards overcoming these difficulties. The advantage of using soda as a base is that wood of much greater rosin content can be cooked with the resulting liquor, and pitch and rosin troubles eliminated. With all these advantages to be gained by changing from lime to soda as a base, the natural thing to do, therefore, is to find some way of reclaiming the soda, so that the extra cost over the process when lime is used would be eliminated, and this is where the advantage of having a sulphate mill in connection with sulphite operation is a great benefit.

As is well known, in the sulphate process, after the pulp is cooked, it is blown either into diffusers or wash tanks, the black liquor washed off from it, then run through steam evaporators, from there to disc evaporators, from there through rotary incinerators where it is converted into ash, and from there to smelters where it is smelted—the resulting liquor causticized, the whole process goes over again.

In the sulphite process, as ordinarily used, that is with lime as a base, the resulting liquor obtained by washing the pulp does not vary a great deal from the resulting liquor obtained from sulphate pulp in the sulphate process. In the sulphate process the lignin or woody matter is used to furnish fuel value to melt

the soda in the reclaiming process; in the sulphite process, the same lignin is capable of furnishing the same fuel value, but the difficulty is that lime will not fuse and burn like soda. When the experiments had reached this stage, the idea occurred of using soda as a base in the sulphite process, giving all the advantages outlined above, then recovering the soda, and using it either to form fresh sulphate liquor or to combine with more sulphur dioxide to form fresh sulphite liquor. In other words, it is possible when using soda as a base instead of lime to recover the soda and make up any losses by means of salt cake as in sulphate process or soda ash as in soda process and using liquor so produced over again. In this way a complete sulphate mill is not absolutely necessary, the only parts needed being the recovery units, and as the amount of soda used is very small per ton of pulp one ordinary recovery unit can handle a good deal more tonnage than by the regular sulphate process. After the pulp is washed, care being taken to keep the liquor as heavy as possible, it is tested and if neutral or alkaline it is all ready for use; if slightly acid it is neutralized with a little soda and is then ready to be handled either in the sulphate mill or in the recovery unit of the sulphite mill. The liquor is evaporated in a steam evaporator brought to still higher density in disc evaporators, then burnt in an incinerator exactly the same as in the sulphate process. The resulting ash burns readily just the same as in the sulphate process. In this way about 75% of the soda used as a base can be recovered. That leaves only 25% to be paid for against the lime. The saving in bleach alone more than offsets the 25% loss, whether resulting soda solution obtained from smelt is used in the sulphate mill or re-used in the sulphite mill, if mill is not connected with a sulphate mill, from a commercial standpoint it will pay to recover. Another tremendous advantage of putting in a recovery unit on the sulphite process is that it is getting more difficult every year to dispose of the sulphite waste liquor, as in a good many districts the restrictions are becoming more stringent every year. A certain amount of it is used as a core making material or binder for roads, but in most mills the general practice is to run it to the river as long as possible. But in the future some other means of disposal will have to be found, and the most logical one appears to be the one outlined.

Advantage of Using Superheated Steam for Sulphite Cooking

By EDWARD SIMONSON

IN the past few years the use of superheated steam has become very general and the benefits, especially to the sulphite cooking, are many.

It is not my intention to discuss the benefit of superheated steam for engines and turbines, but to show the advantage in the use of superheated, and the disadvantage of the dry saturated and wet steam for sulphite cooking, or, in other words, the different effects on sulphite cooking from using different qualities of steam. In order to give a fair judgment to the statements in this article regarding the different effects on sulphite cooking from using different qualities of steam, we will remember that dry saturated steam causes condensation from the boilers to the place where it is to be used, and wet steam, of course, causes still more condensation, but not so with superheated steam, which remains in a dry condition until all superheat is lost.

The heat lost by the steam passing through the piping from the superheater does not cause condensation and, if nothing else could be said to the advantage of using superheated steam, this is a good point in its favor, as the writer is fully convinced that every pulp and paper maker agrees on the great benefit to be had in the use of superheated steam for cooking purposes as well as for drying of the pulp and paper.

Opinions regarding the benefit of using superheated steam for sulphite pulp cooking may differ, but let us remember that there is nothing so valuable to a subject as the bringing forth of different opinions, for it has been through different opinions, expressed in word and carried into action, that our great pulp and paper industry has been developed to one of the largest industries in the world. In order to get this industry, as well as all others, to perfection, it is still open for opinions and discussion.

In cooking sulphite pulp we know that in order to obtain good results, both where yield and quality are concerned, the acid used for cooking must penetrate every fiber in the wood, and as our wood as a rule is mixed (wet and dry), it is clear to us that the acid penetrates the dry chips first, and consequently they receive the best and first strength, and the wet chips in the digester will have to depend on the weaker acid, which is contrary to the cooking process.

In acid tests taken from the bottom, the center and the top of the digester after four hours cooking (of a ten hour cook) with saturated steam, the difference of strength from the three different places

in the digester gave a very interesting and surprising result.

There may be danger for the quality of pulp in the use of superheated steam for cooking purposes. Let me word this expression more to the point by saying that it requires more skill and closer attention by the cook when using superheated steam.

The first thing I observed when using superheated steam was black hard chips mixed with good pulp. This happened about thirty years ago, so I expect a very moderate criticism from the reader when I tell that we hunted for a long while before discovering the cause. Now, of course, it is a well known thing, but it may still be interesting to repeat the experience.

We filled the digester with acid to the same point as usual, expecting that the moisture and condensation would increase the liquor capacity, thereby keeping the chips covered with liquor until they began to dissolve. As we were not well enough acquainted with the nature of superheated steam for cooking purposes, the result was as stated, black burned chips on the top of the digester. This is one danger in using superheated steam for cooking, as the liquor in the digester decreases with superheated steam, and if the chips are not covered with liquor at the temperature of 100°-110° C, there will either be black or yellow hard chips which will not dissolve after having been first touched by the dry gas and steam at a high temperature. This, of course, does not happen any more, as every sulphite man knows the remedy for this evil.

Where I have used the word "danger," it does not mean that the use of superheated steam should be considered as dangerous to the cooking. The danger lies not in the superheated steam itself, but in the handling of it. Where superheated steam is introduced for cooking sulphite pulp, the cook should be instructed about the nature of it and, as far as possible, about the different effects of superheated, dry saturated, and wet steam. It would not take long for a bright, experienced cook to notice the valuable difference in the quality of the pulp and how much handier it is to cook with superheated steam.

It is well known that superheated steam is a benefit, where yield, color and strength are concerned.

Taking a trip around the screen-room we sometimes see (probably too often), good wood which should have been converted to good pulp, passing over the screens. When we notice all the waste of good wood we know there is a cause, and if we would trace back to the cause for all this waste we would find that nine out of ten cases could directly or indirectly be credited to the use of saturated and wet steam.

Quality of Acid Is Increased

The dry saturated and wet steam do not effect the quality and quantity of pulp through the cooking only, but also through the acid plant, which is in close touch with the digester, and in fact the acid plant is depending on the quality of the relief from the digester to build up the quality of acid for cooking purposes.

It is the quality of relief which decides the whole cooking process, and for that reason we should be very careful that the diluting of the acid in the digester during the cooking process should be reduced to the smallest possible degree. As we always have more or less moisture in our wood which is diluting the acid in the digester, condensation of the steam should be avoided, and the only solution is the use of superheated steam.

The writer would not recommend a too high temperature of superheated steam, as it is not necessary, but just enough to prevent condensation through the piping from the boiler to the digester.

There is a question which probably would arise, and that is,—will the use of superheated steam decrease the quantity of relief from the digester and thereby cause a decrease of quantity in the acid plant? In answer to this question will say, yes, it will decrease the quantity, but it will increase the quality. By the increase of the quality of the relief we can increase the quantity as well as quality in the acid plant, and in order to increase the quantity, the acid plant must be operated and prepared to absorb the stronger SO_2 which is coming back from the digesters as a result from the use of superheated steam. There is no doubt that the use of superheated steam is a great benefit to the sulphite pulp process, and it also decreases the cost of manufacturing.

The greater yield of the wood only is a decreasing expense to the manufacturer of sulphite pulp, especially now when the cost of wood is so high.

Some years ago when spruce wood could be obtained for less than a quarter of what it now costs, there was very little saving; in fact, saving of wood was not considered at all. But those days belong to the past and the great question now is—"How long will we be able to buy wood for any price?" Wood for fibre purposes is now a great problem and every ounce of pulp must be saved, and every chip of wood must be converted into pulp if our pulp and paper mills shall continue to be operated satisfactorily.

It is not only the wood which is benefited by the use of superheated steam, but there is also a decrease in coal consumption per ton of pulp. One of the greatest things is the satisfactory quality of pulp, as a high grade of pulp can always find an open market. If the yield, quality and quantity of sulphite pulp cooked with saturated steam would be checked up with the yield, quality and quantity cooked with superheated steam and the results compared, the difference would be very surprising, and there is no doubt that superheated steam would be used more in our mills, especially now when competition, labor and materials are high and a high grade of pulp is always in demand.

Practical Considerations in Paper Costs

By JOHN R. LOOMIS

Loomis, Suffern & Fernald, Certified Public Accountants

Address by H. B. Fernald Before Connecticut Valley Local Division, October 10, 1921

MR. Edward N. Hurley, when chairman of the Federal Trade Commission, in an address once said: "Among the essentials of efficiency in any business, correct and adequate knowledge of that business is first. That is that the foundation, and the cornerstone of a knowledge of business is the knowledge of costs. But the unfortunate fact is that a large proportion of business men in the country do not know their costs accurately."

These remarks were true when they were made and are hardly less true today. If conditions were normal we might perhaps point with pride to the progress which has been made in the cost accounting of the paper industry; both in the higher general standards of accounting and to the more widespread recognition of the importance of proper cost statements; but under the extraordinary conditions of today, the progress made has hardly been sufficient to offset the greater problems and difficulties which have arisen.

There are more plants which actually have cost systems in use and better statements of costs are furnished by such systems, but the mere introduction of better methods and even the obtaining of accurate costs does not meet the real problem. The mere compilation of proper cost figures, important as it is, does not meet the practical situation which, as Mr. Hurley points out, is that business men must know their costs accurately. Cost figures may merely be history, and as history may represent expensive volumes on library shelves. They only come to have practical value as they are properly understood and interpreted and given active life by the practical men who can and will apply them in the operation and administration of the business.

Manifestly, the right system is essential because no proper conclusions can be drawn from improper figures, and correct figures cannot be expected if the system is so involved and complicated that the clerks working upon it do not have a clear conception of what the figures they enter are supposed to mean. No less important is the fact that the busy operating men will not as a rule give the time to study a complicated system, and they cannot be expected to place reliance in and base actions upon figures resulting from an accounting system which they do not understand.

Stock, Conversion and Burden Classification

Accordingly the chief consideration in any system is simplicity. This was one of the endeavors of the writer in his original classification of paper costs under the divisions of Stock, Conversion and Burden, which are the classifications now generally recognized, having been widely distributed by the American Paper and Pulp Association, and also set forth in the report by the writer for the Special Committee on Uniform Costs for News-Print Manufacturers in 1916.

This classification of the various items entering into the cost or newsprint paper, sulphite and ground wood, grouped under the general headings of Stock, Conversion and Burden is shown in the accompanying table which, with slight changes in items of stock and conversion, can be made applicable to any paper product.

This table shows all the elements entering into the cost of production, grouped under three general classes: viz., Stock, Conversion and Burden—Stock including all raw material used; Conversion including labor and all materials used in converting the raw material into the finished product; Burden including, generally, all charges necessary to be included in the cost of manufacturing other than stock and conversion, such, for instance, as taxes, insurance, rents, interest on bonds and other obligations, reserve for depreciation.

The items grouped under Stock and Conversion give little trouble, as their character as elemental products is so generally recognized, they offer no difficulty either in calculation or allocation. It is with the introduction of the factor of Burden that the science of costs becomes more complicated. The minor elements of Burden offer no particular difficulty. It is the items of interest on bonds and other obligations and reserves for depreciation that give rise to argument and dissension. The fact remains, however, that these items must be considered in determining a reasonable profit on a product, and should be included in determining the cost of manufacturing f. o. b. mill.

Such a statement of costs as this manifestly comes under the classification of a "process cost" as distinguished from a job cost, and is the simplest form of cost accounting which can be used. It might practically be said that this treats the entire production of the plant as a single "job." Not merely does it have the advantage of simplicity, but where this can be done it has the further advantage of greater accuracy because the margin of error on a large production treated as a single unit is reduced to the minimum.

When consideration is given to mills which do not

operate on a single product but have various grades of paper on which cost varies, we can no longer consider the entire production as a single unit but must break our costs up into "job costs," segregating the cost of the entire plant to the various jobs which constitute the entire production. This is a necessary plan of accounts should be simple and readily understood by the busy man.

The cost statement should meet the demands of the busy man, so that he may readily see what is going on. Records should be so clear that the ordinary man can understand them, the ordinary clerk

Paper	Sulphite	Ground Wood
(a) Stock:	(a) Stock:	(a) Stock:
1 Sulphite—Own Make	13 Prepared Wood—Spruce	13 Prepared Wood—Spruce
2 Sulphite—Purchased	14 Prepared Wood—Balsam	14 Prepared Wood—Balsam
3 Ground Wood—Own Make	15 Prepared Wood—Hemlock	
4 Ground Wood—Purchased	16 Prepared Wood—Chips	
5 Sundry Fibres	17 Sulphur	
6 Waste Paper	18 Lime	
7 Wrappers	19 Limestone	
8 Fillers		
9 Alum		
10 Bleaching		
11 Color		
12 Size		
(b) Conversion:	(b) Conversion:	(b) Conversion:
20 Manufacturing Labor	20 Manufacturing Labor	20 Manufacturing Labor
		21 Pulp Stones
22 Machine Clothing	22 Machine Clothing	22 Machine Clothing
23 Wires	23 Wires	23 Wires
24 Screen Plates	24 Screen Plates	24 Screen Plates
25 Belting	25 Belting	25 Belting
26 Lubricants	26 Lubricants	26 Lubricants
27 Finishing Material		
28 Repairs—Material	28 Repairs—Material	28 Repairs—Material
29 Repairs—Labor	29 Repairs—Labor	29 Repairs—Labor
30 Fuel—Coal	30 Fuel—Coal	30 Fuel—Coal
31 Fuel—Oil	31 Fuel—Oil	31 Fuel—Oil
32 Fuel—Wood	32 Fuel—Wood	32 Fuel—Wood
33 Fuel—Waste	33 Fuel—Waste	33 Fuel—Waste
34 Cores		
35 Miscellaneous Operating	35 Miscellaneous Operating	35 Miscellaneous Operating
36 Water Rent	36 Water Rent	36 Water Rent
37 Power—Electric	37 Power—Electric	37 Power—Electric
38 Power—Steam	38 Power—Steam	38 Power—Steam
39 Lighting	39 Lighting	39 Lighting
40 Mill Office	40 Mill Office	40 Mill Office
41 Barn or Teaming	41 Barn or Teaming	41 Barn or Teaming
42 Switching	42 Switching	42 Switching
(c) Burden:	(c) Burden:	(c) Burden:
43 Taxes	43 Taxes	43 Taxes
44 Insurance	44 Insurance	44 Insurance
45 Rents	45 Rents	45 Rents
46 Interest on Bonds, etc.	46 Interest on Bonds, etc.	46 Interest on Bonds, etc.
47 General and Adm'n Expenses	47 General and Adm'n Expenses	47 General and Adm'n Expenses
48 Reserved for Depreciation	48 Reserved for Depreciation	48 Reserved for Depreciation

complication and cannot be avoided, but it should not cause one to lose sight of the importance of simplicity in the accounts. In fact, the greater the number of subdivisions which must be made in the accounts, the more important it is that the general understand what he is doing and the officer can follow them easily.

If any practical use is to be made of cost statements, it should be possible in a rapid review to see what are the important elements of cost and what the

effect on final costs may be of variations in any factor at any point. The important factors should not be lost in a mass of details relating to immaterial factors.

It is not the purpose of this paper to discuss system details, and the outline given has only been for the purpose of illustrating the practical considerations which arise in the use and interpretation of the cost figures.

The importance of simplicity has been referred to, and important aid in obtaining this is a clear chart of accounts, understood both by the operating men and the accounting department, and this should be accompanied by a definite statement of the items to be included in each subdivision of the accounts and the bases to be used in overhead apportionment. No system of accounts is going to be satisfactory unless it is based on a plan and grouping of the accounts which the accounting department feels it is practicable for them to handle and which the operating men feel will give them the practical information which they want. Furthermore, such a chart, once agreed upon, must not be allowed to become a dead letter, but as changes in organization and operations from time to time occur, any necessary changes in the chart must be made, or the cost accounts will contain erroneous figures or will be used as the basis for wrong conclusions.

The importance of accuracy has also been referred to, but this is a point which is often misunderstood. There are figures in the cost statements which can be presented with the same definiteness and the same standard of accuracy that applies to a cash account but there are other figures which are, and must be to a certain extent, estimates. We can show with accuracy the cost of raw materials purchased, and we can supplement the general cost statement with records of materials consumed. Sometimes we can show the actual cost of the particular materials which entered into a definite lot of paper. Usually, however, we can only assume that the raw materials consumed represented some part of the total materials which had been purchased, and we take these into cost at a price determined in a definitely recognized manner. We can tell exactly the amount of the pay roll for any period, but when we come to apportion the pay roll to the various departments and jobs the apportionment involves the use of estimates. Depreciation is a definite factor of cost, but its amount can only be determined by estimates. From a certain standpoint it can be said that no cost accounts are more accurate than the estimates upon which they are based, but recognizing the extent to which estimates are essential, we can set up a standard of accuracy for the cost accounts through insisting that the calculations made should be correctly made and that the figures used should represent what they are supposed to represent.

This standard of accuracy must be applied not only to the dollars of cost, but also to the statistical information which is no less important. All stock or furnish should be stated at actual weights. By the use of actual weights (air dry) the manufacturer is enabled to obtain the percentage of stock used in production and the loss in yield quite free from matters of estimate. These percentages and the quantity used per ton of production are all of even greater value to the mill superintendent than the dollar and cents value of each item of stock used and conversion expenses.

In the determination of the cost of production the only object in the minds of many is the final cost f. o. b. mill. This is, however, an erroneous impression; the information obtainable in the development of costs is even more valuable in other directions. It furnishes the necessary data by means of which excessive costs can be reduced, by eliminating unnecessary expenses or increasing the production in such departments where inefficiency as indicated by the cost sheet is shown. The greater value in the developing of costs is the attracting to the attention the items entering into production with a view of improvement in production. The value is more in watching the items entering into production than of developing figures as a basis of fixed selling prices. With this in mind the cost sheets should reflect as much information as possible, particularly the quantities of materials consumed that their percentage of consumption, production and consequent loss in yield may be readily obtainable.

Locating Responsibility for Excessive Costs

The basic idea of the operating man as he reviews cost statements is usually to see where troubles have arisen and what steps are necessary for their correction or prevention. To enable him to do this, the costs must be so stated that responsibility can be located.

The cost statement should be worked up so that the management can see where the trouble lies, what the cost of inefficiency may be, so they can take up the actual facts with the proper man, and not try to hold the man responsible for features beyond his control.

Your machine man is responsible for the amount of power used on his machine, but he is not responsible for the cost per unit of power that comes from your power house. Your power engineer is not responsible for the price of coal, nor for the excess load on the power plant in time of low water, but he is responsible for the amount of power generated per ton of coal. He may or may not be responsible for the power loss in transmission, but somebody must be. He may or may not be responsible for the overload of the power plant when the turbines break down, but somebody must be.

The various cost and operating statements must be so compiled and presented that they will enable the operating men to locate this responsibility. More

emphasis has been laid on locating responsibility for troubles, but manifestly it is no less important to locate responsibility for particularly good work. The detection and the elimination of troubles will keep a business to its present standard of efficiency, but that standard will be raised by noting how and where exceptionally good work is done, so that the whole plant may benefit by the lessons to be learned from the good work of one man or one department.

This review of the statements by the operating men is one of the best audits that the cost accounts ever get. Clerical errors will occur, so that one job or one department will be over or under-charged with amounts which should go elsewhere. Minor errors may escape attention, but any material error should be caught in the review by the operating men and, when found, the proper correction should be made in the cost statements. The making of such corrections has a good moral effect on both clerical and operating forces. It will also prevent using erroneous figures in future estimates, with perhaps serious financial loss to the business.

Relation of Cost to Selling Price

Assuming then that we have a correct, simple and adequate system of cost accounts working well in the office and satisfactory to the operating men, we may then look at the relation of costs to selling prices.

Prices should represent the cost of production and the cost of selling, together with a reasonable margin of profit, but no manufacturer can make an arbitrary rule that his selling prices will be his costs plus what he believes is a fair margin of profit. Competition is a dominant factor.

There is no uniform basis of costs between mills, the location of the plants, the owning or purchasing of timber, woodlands bought years ago resulting in a less stumpage charge, variations in the labor market, better or poorer judgment in buying materials, etc., all contribute to placing the price to be gotten for the product on a competitive basis.

No mill can run 100% of the time on the particular kind of product which for it may be most profitable. It has to handle some less profitable product. No manufacturer can afford to mislead himself by figures which show that a certain product will give him little or no profit if it is a product which must be turned out to keep his plant running at current capacity. He may even be faced with the question of whether he should keep his plant running or should close it down. It then becomes a practical consideration whether the manufacturer whose cost sheet shows that Superfine Writing is costing $1.50 per pound, should take an order at a market of $1.50 per pound in order to preserve his organization and retain his trade until such time as conditions become so corrected as to enable him to run under normal conditions of profit.

Furthermore, the paper trade is today at a time of change of price. Cost of producing paper six months ago is not a definite indication of what it is going to be this month or the month after. Manufacturers have to use their old costs as a guide, but they must have their costs so classified and arranged that they can tell just what difference in cost of producing paper will result from a change in the price of pulp, change in the volume of production, change in the labor scale, change in the price of fuel, etc., or change in the length of run on a single order or class of paper.

We can even go further and say that known future costs cannot be entirely a basis for fixed price. For example, the manufacturer who has on hand or has contracted for sulphite at a price above the current market should not lose business merely because he will refuse to sell at any price which will not fully cover the cost on the materials which he is going to use; nor, on the other hand, should the manufacturer lose the profit he is entitled to because he happens to have materials which have cost him less than the current market.

A strong illustration of this latter point is in those mills which make their own pulp.

Some paper manufacturers have been foolishly improvident in not giving fair consideration to the value of the timber they have been using; denuding pulp lands and figuring in many cases that they have made a profit on paper, when all they have been doing was realizing an increased value of the timberlands they own.

If a mill manufactures its own pulp and can sell that pulp on the market for a figure more than can be realized through finished paper, there is a question of whether the mill is not really losing money. It may be worth while to take such a loss temporarily in order to hold the business and tide the mill over until a time of better prices or better manufacturing conditions. But the mill does not make money on paper manufacturing unless it can realize more from its paper than can be gotten out of a mere disposition of pulp as such.

A New Development in Paper Machines

By L. E. MILKEY
Sandusky, Ohio

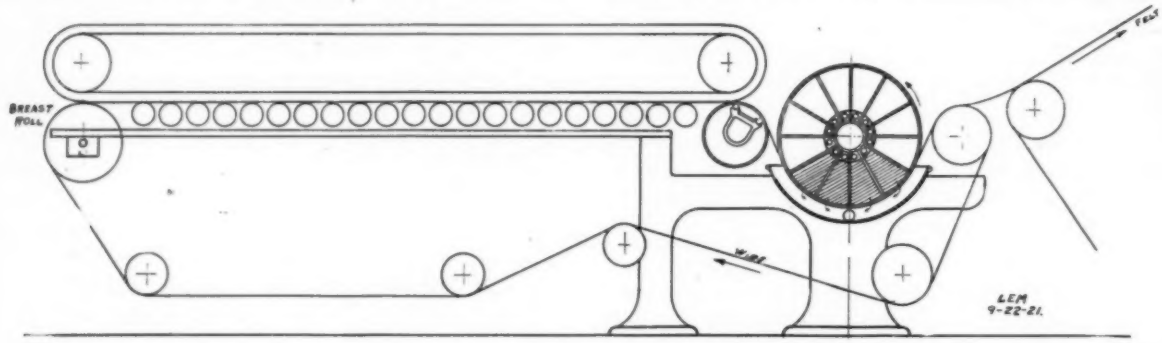
AN IMPROVED method of de-watering and drying a sheet of paper immediately after it has been formed on the orthodox paper machine has recently been brought out, and tests made on a small 17-inch paper machine over a period of months give promise of some important changes in future paper machine design.

It is a matter of common practical knowledge that once the sheet has been formed and its formation "set," the purpose of the rest of the machine is almost entirely confined to the removal of the vast amount of water that accompanies the relatively very small amount of fibres and other materials that go to make up the finished sheet of paper. Much of this water

is drained out through the meshes of the wire by gravity assisted by the numerous table rolls. It may be added that, as paper machines become faster in speed, the time for this gravitational elimination of water is very much reduced, unless the wires are made of unwieldy length. In the present conventional machine the paper passes over a number of flat suction boxes and then over a suction couch roll, or through the old style top and bottom couch rolls, and onto the first felt. At this place on the machine the paper, depending upon its makeup, the speed of the machine, and condition of the equipment, may be anywhere from 5 to 18% bone dry; with a few exceptional papers like grease-proof, perhaps as dry as 25%. Additional squeezing by, in some cases, as many as six pairs of press rolls while the paper is carried on felts, is required to remove enough more water to take the paper onto the driers for the evaporation of the remaining moisture.

With the improved method herein described and which is the subject matter of patents recently issued,* a new device is employed for the more complete removal of the water from the sheet immediately after it has been formed and set, and this accomplished without the deleterious effect upon the sheet such as results from the present heavily weighted press and couch rolls. Instead of mechanical pressure for the elimination of the water, compressed air is employed and in such a way that many additional advantages are obtained.

The accompanying drawing shows the air blowing device applied to a Fourdrinier type of machine. In this case it will be seen that it supplants the ordinary couch part of the machine and nearly all flat boxes, or all of the flat boxes, if a suction roll of the revolving type is used as shown. The otherwise necessary length of the Fourdrinier part is thus materially reduced. The sheet of paper supported on the wire is trained around the lower periphery of the blowing roll, a roll made with internal construction which permits compressed air to be blown out through the perforated and wire covered surface and against and through the newly formed sheet over a controllable area and under controllable pressure and air condition.



The compressed air is supplied by ordinary compressors preferably of the rotary type, and is preheated and treated for moisture removal in conventional means. The surface of the blowing roll which is perforated, is either covered with a fine mesh wire jacket or the machine itself is equipped with a short top wire.

The sheet of paper is therefore actually confined between two similar wire meshes, the bottom one being the Fourdrinier wire itself. As the paper is thus carried past the blowing area, it is subjected to a blast of hot, dry air under pressure, while, at the same time, it is given a mild and beneficial mechanical pressure by the tension of the bottom wire as it passes around the blowing roll.

Actual tests have demonstrated that this treatment of the newly formed sheet at this point on the machine will result in the elimination of a much greater amount of water than it has heretofore been possible to take out up until the time the paper passes onto a felt and into press rolls. In fact, in some cases the sheet is sufficiently dry to be taken, if so desired, immediately to the dryers without the use of any presses and felts except perhaps the use of smoothing rolls for wire mark elimination where this proves objectionable.

The employment of hot, dry air in the blowing roll causes a large amount of moisture absorption to take place during and after the first blast of compressed air strikes the paper with a very high velocity, which itself carries out the free water present.

It was expected that not all grades of paper would respond similarly under this treatment. Those made from the free and less hydrated stocks show very good results, and it is obvious that the process is particularly well adapted for the making of porous and absorbent sheets of any desired thickness or bulking qualities. Tests that have been made on stocks similar to roofing felt have shown it possible to produce a bulkiness for a given weight equal to twice that now obtained on the standard machine, either Cylinder or Fourdrinier. For lighter weights, including news, the process lends itself also to the employment of high operating speeds and with a total machine length of only a fraction of that of some of the latest high speed machines.

* U. S. Patent No. 1,387,061 issued August 9, 1921.

Keeping Machinery in Condition

By K. H. COUGHLIN

VERY few industries can boast of such expensive machinery as is found in paper mills.

The paper machine costing according to its width from eighty to one hundred and fifty thousand dollars, is well worth the closest possible attention to insure slow depreciation.

The clothing, such as wires and felts, which are used on this machine are also very expensive and must have special care, if their full value is to be realized.

Very few mills have any special system of inspection of machines and equipment, so the writer will endeavor to outline a policy that will cover this point and produce profitable returns to any mill following this idea.

The master mechanic of a paper mill is as human as anyone else employed, and the great majority of them find their time pretty well occupied in repairing machinery that is continually petering out, and this fact alone emphasizes the necessity of better inspection of machinery in order to reduce or eliminate expensive repairs to some extent.

The beater engineer usually calls the attention of the master mechanic to the condition of beater roll bars or bed plates. The journals of the beater rolls are more or less neglected in most mills.

The paper machine, with its great number of expensive rolls, housings, and so forth, are usually left to the judgment and attention of the three machine tenders, each one, refusing to accept responsibility for their wear or destruction.

When a part of a paper machine goes bad and the Super mounts his charger determined to ride down the man responsible, he drives against a stone wall, for one machine tender will declare he left the machine in perfect condition, while his mate is positive that he did not. And so the merry chase goes on all through the mill. No one specifically responsible, and the poor master mechanic at his wits end to keep things moving.

The writer was confronted with these conditions for quite a few years before he cut his eye teeth in the paper making game. Every other day brought a shut down of some machinery. Sometimes it was a broken shaft or a gear stripped of its teeth, and before the advent of the electric motor, steam engine troubles were frequent and costly.

Finally he devised the following system which cut repair bills in two and increased production to a considerable extent.

He called into conference the master mechanic, the foreman of each eight-hour shift, the best machine tender on each shift, also the beater engineers, the foreman of the calendars and cutters and the chief engineer and his chemist.

The cost of repairs and frequent shut downs and consequent loss in production was solemnly described and the meeting of all these paper mill worthies was for the purpose of prescribing and applying a remedy that would cure the conditions.

Each one present had his own sad story to relate, and it was with much difficulty that the master mechanic and some of those present were prevented from banging one another on the nose.

Facts were brought out that had been under cover for a long time, and each man seemed anxious to bring to light troubles that he had nursed secretly for some time, and when it seemed as if the meeting would end in a free for all fight, I "took the floor" and succeeded in making each man understand that we were assembled to straighten these matters out and by coöperation, help each other in every possible way.

Finally, we eliminated all jealousy and hard feelings and some excellent suggestions were presented, the following being adopted:

First: The whole Committee was to act as an inspection committee and once every two weeks were to inspect machinery and general mill conditions. Each inspection was to be followed by a meeting at which any point or suggestion of a member of the Committee was to be discussed and acted upon.

After our first inspection and meeting we adopted and put into effect the following ideas:

1. The oiling of all mill machinery to be done by two competent and intelligent men. Our inspection showed a shameful condition of neglect of proper oiling.

2. Consultation with oil experts to determine proper lubricants to fit conditions.

3. Oil reports kept up to date and oil costs inspected monthly.

4. Belt records and costs to be inspected monthly at Committee meeting.

5. Cost of repairs in each department to be inspected monthly.

6. All parts of machines in need of repairs to be tagged and remain so until repair had been made.

7. Immediate employment of three more mechanics, until such time as urgent repairs were completed.

We stuck close to our jobs and the reader would doubt the results that were obtained, unless he could have seen what wonderful advances in production and economy were made in this plant.

It was a revelation to me, and every month brought new ideas and improvements.

The new conditions were appreciated by every man in the mill. Their work was made easier, and better.

The owners of the plant appreciated same and showed it by rewarding the members of the Committee, who had made these things possible.

I knew an old and successful superintendent, who once told me that a man could run fifty paper mills if he had the right kind of men in the mills, and I would add to that statement, if you had those kind of men and gave them the opportunity of having something to say about the management of the mill, there is not the slightest doubt but what one man could run fifty mills, successfully.

One man alone without coöperation of the right men cannot be successful in the operation of a paper mill. He may succeed for a time, under abnormal conditions, but when competition is hard, he will fail.

Ours was a simple idea, but it was the missing link in a plant that should be able to compete with any in the industry and today it has found itself and is coming along at a fine rate of speed.

I trust that others may reap the benefit of this idea, if they have not already thought it out and received its benefits.

Power Plant Management

The Human Factor in the Problem of Increasing Power Plant Efficiency

By ROBERT JUNE, M. E.

IN PREVIOUS articles, we have discussed various power plant instruments and a number of types of equipment, indicating conditions under which these could be used or could not be used advantageously, and suggesting methods of effecting economies in operation. Since our discussions have followed the line of accepted good practice, the points brought out and methods suggested have the sanction of authority, and constitute a valuable plan of procedure in our program of increasing power plant efficiency.

It is one thing to lay out a program, however, and another to execute it, as anyone who has ever tried to stimulate the morale of an operating force and increase the efficiency of power production, knows. The problem of economical boiler and furnace operations contains a large psychological factor which must be taken into account, if satisfactory results are to be secured.

Let us assume that it is desired to increase the efficiency of a given plant. The first step is the installation of necessary recording apparatus. Very few instruments are needed for an ordinary plant, but these must be regularly used and the records reviewed and studied. It is a waste of money and effort and will defeat our purpose to go into greater instrumental refinements than the operator can intelligently understand and handle in every particular.

Gauges Should Be Installed

This we can say unreservedly; every boiler setting should have a draft gauge system capable of instant and constant indication of boiler outlet and furnace draft. Accurate water measuring and coal weighing devices are desirable. The chief engineer of a plant of, say, 600 hp., or larger, should also possess a standard orsat or gas-handling set, and temperature records and observations should be preserved.

Supposing, now, our plant to be equipped as described. The business of effecting conservation in a steam generating plant goes far beyond a mere experiment by trial of the sources of preventable loss and the making of suggestions for improvement. If improvements are to be made, they must be made under the direction of a competent individual. This may be the chief engineer or boiler room superintendent, or it may be that an outside efficiency engineer is called in. In any event, the individual who is responsible for the improvement has a job on his hands, requiring, above everything else, tact and good judgment.

Let us take, first, the case of the outside so-called efficiency engineer, who is called in to investigate plant conditions, with the object of effecting improvements. The personality of this man is, by all odds, the first and most important consideration. His work will be a bitter disappointment to his client if he does not possess the ability to advance his technical findings in a way that will call into play the loyalty, skill, and energy of the men over whom he is to have more or less supervision. It is infinitely preferable to engage a man of mediocre technical likableness than to employ a more learned, but tactless, scientist, so far as permanent benefits are concerned. Let us see why this is so.

Outside supervision is decided upon. The engineer assigned to effect the improvements, visits the plant and goes over its layout; he questions the operating forces, conducts certain preliminary tests, and perhaps places in the boiler room an assistant more or less equipped with knowledge and instruments. The results of this preliminary investigation is usually a report between 20 and 40 pages long, containing statements of fact as to adaptability of fuel, draft, gas analysis, plant routine, and operating methods; it is apt to contain criticisms with respect to all of these; it may attempt to show the effect of one de-

ficiency upon all the rest. In hardly any instance is the plant fully equipped for first grade performance. Therefore, suggestions are offered to the management, with respect to certain changes or additions to be provided in the equipment, and the reasons are given to support such recommendations. After the management has gone over the report, it gives the chief engineer a chance to mull it over, and from him it receives back a guarded criticism of the findings. He praises the report faintly, and, because the operating forces have proven themselves loyal and capable in the past, in so far as the management has been able to determine, the effect is to delay constructive action on the program outlined in the report.

Now, why does the operating engineer look upon the efficiency man with a cold eye? Well, in the first place, when it comes to intimate knowledge of the details of operation, such as likelihood of sudden extreme demands for steam, or the reverse, the operating man knows from experience the condition in his plant, while the outsider cannot possibly get it all. The efficiency engineer, therefore, is at a disadvantage. Very likely the operating engineer will, in his own mind, lay great stress upon some minor matter, while overlooking important phases of operation, and the mere fact that something known to him has not found its way into the report prominently, causes him to discount all the rest.

Win Confidence of Operating Force

Operating forces are only human and the spirit of resistance is set up against any suggestions offered by the outsider. Now the technique of operation has a more important bearing on the attainments of high efficiency in boiler practice then any other factor, consequently, unless the efficiency engineer can win the confidence and backing of the operating forces, his work will be valueless. Modern production practice calls for rapid changes in methods, as new and better ways of doing things are discovered. If the boiler room in question supplies a large factory, the chances are that the management and all of the factory department heads are thoroughly alive to the frequent necessity of change. They live in an atmosphere of progress and do not make radical changes in location of machines and methods of handling operations, if these seem desirable. The boiler room is a different proposition. Here the tendency is to refer everything to custom and precedent. The operating men have performed their duties in certain individual ways, and no complaint has heretofore been registered against their methods. Why, then, should a change be proposed.

The very first requisite of an improvement is, therefore, ample time in which to effect it. The services of the efficiency engineer are of value to the plant management in increasing proportion to the length of service; that is to say, the service will be six times as valuable to the management if the time is spread over a period of a year than if it is confined to two months, and three times as valuable as over two. It takes about so long to work out resistance to change, and the operating forces must be given opportunity to accommodate themselves to the presence of one who stands, for the time being, closer to the management than they do themselves.

Granted tact and technical skill on the part of the efficiency engineer, it will be very surprising if the operating forces are not more or less antagonistic to his presence in the plant for a period of two months or more. When the operating men finally realize that the efficiency engineer does not intend to recommend wholesale discharge and that he is not in the plant for the purpose of showing them up, but rather for the purpose of co-operating with them, to the end that they themselves may increase their own efficiency, they will begin to be stimulated by his efforts. If the efficiency engineer has real technical ability, as well as tact, they will begin to respect him for what he knows and for his character.

The process works two ways: The efficiency engineer discovers that his original impressions regarding the plant and the men were incorrect in many details. Real results are finally in a fair way to be attained when the operating men come to look upon the efficiency engineer as a regular employee. It is then much easier to work together and the efficiency engineer can set himself to the real test of his capability. This consists in so managing to suggest his thoughts and methods to the operating men that they will beat him to their expression and execution; in other words, they will adopt the thought or suggestion as their own.

At this point, if the efficiency engineer has managed to get the operating men to advance, as their own, the ideas he is seeking to inculcate, he, to some extent, negatives or depreciates them, the result may be beneficial, in that it may cause the operating men to make every effort to prove the correctness of their views and since the idea is, as they believe, the creature of their own making, unquestioned support will be given to its successful accomplishment.

There is no question that the mental attitude of the operating forces has an extremely important bearing upon the successful operation of the plant equipment. Thus, it often happens that, in a plant containing one kind of mechanical stoker in successful operation, that when a new engineer comes on the job, differences will begin to be apparent in stoker operation which can be attributed more to the prejudice of the engineer than to lack of knowledge or ability on his part to operate the equipment properly. It is, therefore, of greatest importance that any man, who is set up as an instructor over men who consider themselves already thoroughly trained and competent, should possess infinite tact and good judgment. When such a man overcomes the inertia of bad habits, these will inevitably be replaced by the inertia of good habits.

The important thing to remember is that it takes time and much patience to accomplish the desired results. Some managers, it is true, do not have any great confidence in methods such as we have outlined and being impatient of results, believe that the quick and sure way to accomplish reform is to perform, at once, a surgical operation, by discharging the old crews or at least their chiefs.

It is the writer's experience, backed up by the ex-

INSTRUCTIONS TO FIREMEN

General

1. Even load in the neighborhood of 10,000 pounds of steam flow per hour must be maintained on each boiler. Bank one or more boilers if necessary to secure the proper load on each boiler in operation.

2. Maintain even flow of feed water. Permit rise of 8 inches in gauge when load drops rapidly, and fall of 8 inches below normal in gauge in case of sudden demands on boilers.

3. For hand fired boilers. Use the spreading method firing 8 to 10 shovelfulls at a charge, starting from rear and completely covering fuel bed.

4. For stoker-fired furnaces maintain even fuel bed thickness of 6 inches.

5. Go to instrument board after each firing. If necessary adjust damper draft and ash pit draft in accordance with actual load of steam flow obtaining. (See table in paragraph 6).

6. Regulate conditions as follows;

		Pound Hour.				
WHEN;	Flow per boiler is	8000	9000	10000	11000	12000
THEN	Ash pit must be	1.2	1.4	1.6	1.6	1.3
	Damper must be	0.03	0.04	0.05	0.08	0.10
	Fuel bed must be	4"	4-1/2"	5"	5-1/2"	6"

7. Instrument readings must be recorded every 30 minutes on log charts.

8. Steam pressure must be maintained at 150 pounds per square inch at all times.

perience of men who have tried both methods, that the best results are not secured by wholesale firing. A new chief and new assistants are at a loss when it comes to detailed knowledge of plant conditions and the time which it takes to familiarize themselves with these details is largely lost. True, they are less inclined to criticize and withhold co-operation, but they are less capable of making helpful suggestions and of adopting the ideas put forth, to the actual plant conditions. Unless there is actual insubordination and continuous attempts to hamper the work of the efficiency engineer, it is far better to retain the old men who will have at the start of their education a close knowledge of the systems, materials, and equipment with which they have to work.

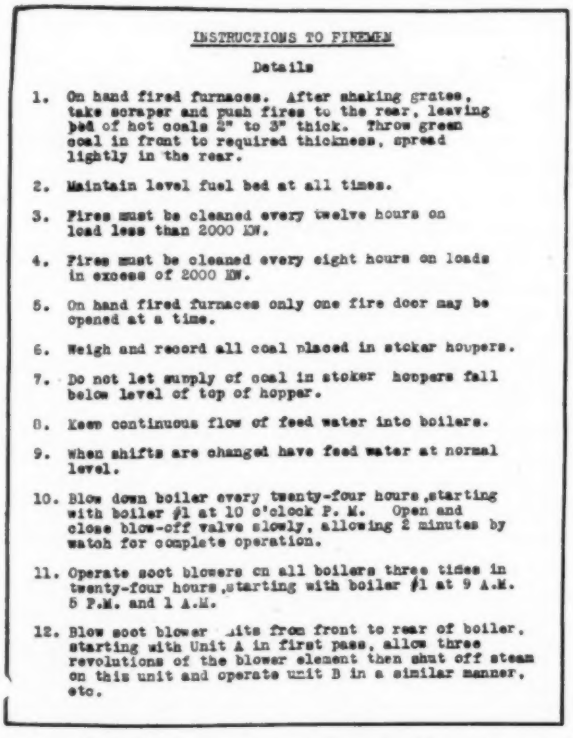
Instruction from Within

In the preceding sections of this discussion, we have considered the cause of the outside efficiency engineer who is called in to improve the efficiency of the plant. All that has been said regarding the necessity for tact and good judgment and the use of a little practical psychology on the part of the efficiency engineer, applies equally well if there is to be a permanent instructor inside the plant. That there is ample need for constant training and instruction by power plant employees, is a fact generally recognized by experienced engineers.

It is clearly the duty of the management to provide proper training for its employees and any management which fails to do this is clearly negligent of its duties. Necessarily, the means provided will depend entirely upon the size of the plant and the operating conditions. Thus, in a large central station, there may be delegated permanent instructors with each shift in the boiler, pump, turbine, and high tension rooms, on the switch board, and with the repair gang, whereas in the smaller plant, a single individual may act both as instructor and supervisor. Between these two extremes, a number of variations are possible. The point should be clearly borne in mind that the expense of such training is small, indeed, in comparison with the savings which can be effected through the work of well trained crews.

The truth must be realized that only by prolonged training can an adult, who has been given his own gait for many years be brought to form new habits. He may recognize the value and importance of doing things by newer methods. Yet, if all his life he has been accustomed to doing them in a certain way, it will take time, effort and patience for him to change. Yet because this change is absolutely essential, it should be conscientiously and patiently striven for, by both instructor and operator.

The value of correct methods is apparent. Thus, boilers, during periods when tests are conducted by experts, give efficiency results which are almost



INSTRUCTIONS TO FIREMEN

Details

1. On hand fired furnaces. After shaking grates, take scraper and push fires to the rear, leaving bed of hot coals 2" to 3" thick. Throw green coal in front to required thickness, spread lightly in the rear.

2. Maintain level fuel bed at all times.

3. Fires must be cleaned every twelve hours on load less than 2000 KW.

4. Fires must be cleaned every eight hours on loads in excess of 2000 KW.

5. On hand fired furnaces only one fire door may be opened at a time.

6. Weigh and record all coal placed in stoker hoppers.

7. Do not let supply of coal in stoker hoppers fall below level of top of hopper.

8. Keep continuous flow of feed water into boilers.

9. When shifts are changed have feed water at normal level.

10. Blow down boiler every twenty-four hours, starting with boiler #1 at 10 o'clock P. M. Open and close blow-off valve slowly, allowing 2 minutes by watch for complete operation.

11. Operate soot blowers on all boilers three times in twenty-four hours, starting with boiler #1 at 9 A.M. 5 P.M. and 1 A.M.

12. Blow soot blower units from front to rear of boiler, starting with Unit A in first pass, allow three revolutions of the blower element then shut off steam on this unit and operate unit B in a similar manner, etc.

never attained in average daily practice. Granted that the conditions of load and service during tests conformed to normal requirements, the only explanation of the failure on the part of the operating crews to maintain equally good efficiencies, is that they do not carry on the work the way the experi-

menters did. Lack of knowledge, and perhaps lack of incentive, are the real reasons for this failure. In very few plants do the firemen receive any training other than a few words of instruction, after which they are left to shift for themselves. As for helpers and coal passers, they are expected to learn by personal observation of the routine work done by others. Such a process of education, if such it may be called, is of too long a duration at its best and it is extremely wasteful in both fuel and labor.

After training and instruction have been given verbally and by example, until the men have reached a certain degree of proficiency, the time is at hand to standardize operations and to put them in writing. Typewritten cards should be placed in the boiler room. These cards should detail all operations and the men should be checked up on their knowledge and compliance with the typewritten instructions. Typical cards are shown in the accompanying illustrations. These cards can be worked out for each individual plant and they are certainly desirable tools for effecting efficiency operation.

Much Ado About Waste

By C. A. EDDY

PAPER manufacturers, just like the manufacturers of every other product, are receiving a lot of good advice about cutting down waste. The present need of economy in every branch of industry justifies this emphasis upon the elimination of unnecessary losses. Inasmuch as this is an easy subject to talk about, however, a great deal of what is being said is not entirely logical. It is easy to tell the housewife to "pare the potatoes thin," but that, like many other things, is more easily said than done.

When a great many people raise their voices in an outcry against the wasteful habits which were developed and encouraged during the late prosperity period, their propaganda often has the effect of obscuring other issues which are not less important than the one they are advocating. Our quarrel here is after all, not so much with the people who give bad advice about eliminating waste as it is with those who give too much advice about it.

A salesman representing a firm manufacturing heating and ventilating equipment which is particularly well adapted for use in the paper industry was talking last week with a paper manufacturer whom he thought was a "hot" prospect. He turned out, however, to be rather lukewarm.

"Why should I spend money improving my equipment when my sales department is runing at a loss. I can't even sell good paper at bad prices. What is the use of attempting to improve the conditions in my factory and quality of my product when the result will be a greater net loss to the company."

That, in substance, was his reason for entertaining no idea about better equipment. That manufacturer is in exactly the same frame of mind as a good many other paper manufacturers, as well as manufacturers of other products. His mental attitude toward his business has swung to the other side of the chart. A year or so ago, he was interested chiefly, if not solely, in production. Today, he is interested in distribution.

How unfortunate it is that so much business thought operates on this pendulum principle. There is just as much need for attention to equipment, just as much need for study of better methods and the elimination of waste today as there was yesterday.

An article published in a recent number of the magazine for which these words are intended, said that the waste of time and material by careless and time-killing employees, may be corrected by efficient superintendents and foremen. Another article in the same number tells paper manufacturers how to keep accident records and something about the value of having such records. Still another article is the discussion of the matter of placing responsibility for industrial accidents and says that more than 22,000 people, according to figures compiled by the National Safety Council, were killed during the year 1919 in industrial accidents. It also says that the same organization found that 500,000 persons were severely injured during the same period while at work.

There is an intimate relation between the problem of the time-wasting workman referred to in the first article and the figures quoted in the other two articles mentioned. When a workman, wrestling with the rolls of paper that come out of the ends of the big machines is knocked over by a hoist, it is often a little difficult to place the responsibility for the accident. If the manufacturer goes on putting all the emphasis on the selling end of his business, the time will come when responsibility for accidents as well as for inferior products will be his.

Getting business is the big game just now. Superintendents, engineers, office managers, employment managers, and many others whose business is normally that of producing are out trying to get orders and in some cases, actually selling stock in the company in order to get ready money. Equipment is being neglected. The man who knows what the temperature of the paper mill ought to be, who knows when the web is being dried too slowly or too rapidly, who knows how long it will be before the machines will need new felts, who was working on a new deinking process, is now learning the art of salesmanship.

This, in our estimation, is waste. Such men should

be in the factory where they belong, keeping up with the parade which will be very far ahead of them when normalcy is again with us.

The Importance of Air

This all gets us back to the question of man power in the paper mill. What does it profit a manufacturer to have the best formulas and buy the best quality of products with which to make his paper if his workmen are dissatisfied or are not doing work up to standard? And who can expect a workman to be up to standard who works in an atmosphere saturated with moisture, where the air is impure and conditions are generally unfit for the best kind of work?

The uses of air in the paper mill are so important and so varied that it is not possible in an article of this character to go into minute detail as to all of the uses for air. Slowly, but surely, the superintendent, in particular, is realizing that without the proper equipment for getting air into the mill, and handling this air to advantage inside, he is not likely to be able to keep up with those manufacturers who have grasped the big problem of the importance of air.

Today we know that it is a case of the "survival of the fittest" in the industry. It is not always possible for a mill to revolutionize its business by entirely changing the equipment, but it is possible for this same mill to increase the efficiency by installing new methods, and that is just where the question of the right use of air comes in, in connection with the manufacture of paper.

For instance, there is the system of warm air which is used to prevent condensation of moisture on the roofs and for eliminating the danger of this moisture dropping on the rolls of finished paper. A good drying system is an important part of the paper business, and not only does such a system result in a better quality of paper, but it saves money in the elimination of the rotting of timbers, roofs, etc., due to the collection of moisture.

Aside from the drying system there is the forced ventilating system which insures a constant supply of fresh, clear air to all parts of the mill. While it is true that the ideas of workers at the present time have changed considerably from those of two or three years ago, it still is a fact that they must be considered and must be kept satisfied and interested in what they are doing, for as a result of impure air they are listless in their work and are off part of the time because of sickness. One of the biggest assets you can have is the interested workman who is always on the job and who is able and willing to give the care and thought necessary to handle his job in the right manner. These kind of men are many times developed as the result of care and thought given by the owners as to equipment which will make the working conditions easier and pleasanter, because, after all, these count big.

One prominent paper mill engineer figured up some time ago that there were at least twenty-six uses for air in actual practice in the paper mill. Some of these were not of as great importance as others, but there is no question but that the uses for air will in a short time be even more general than is the case at present. Some of the other uses, aside from those mentioned above, are mechanical draft in the boiler and engine rooms. The great increase in the use of mechanical stokers, the campaigns of education which the stoker people are conducting and the greater knowledge of the advantages of these methods of firing mean a greater increase in plants installing them, and the mechanical draft fan goes with them. Blowers are also used for moving stock from cylinders, for conveying sorted stock, and in various kinds of absorption systems.

Another advantage in the paper mill is in the use of heating and ventilating equipment for all seasons of the year. In the winter, heating coils, plus a sufficient sized fan, eliminate the disadvantages which come from cold corners in the mill, and cut down the workmen's efficiency. The fan carries this heated air to all parts of the mill, resulting in uniform heat in all sections. In the summer time blowers can be used for bringing in cool, fresh air. Another great advantage comes in connection with the paper machine rooms where, during the summer days, heat is intense and workmen suffer. A good ventilating system installed here works wonders in speeding up production.

You may ask whether this isn't a long ways from the old time methods of paper making. Of course it is, but times change and even in the paper business the things necessary to do today were not thought of a few years ago.

One Man's Experience

The experience of a prominent paper mill executive may prove of interest as showing just how times change. Up until a short time ago this mill, like many others, was run on the old time basis. Little thought was given to the comfort of employees, but a great deal of thought was given to the quantity of paper turned out.

The executive in charge had been solicited time and time again by fan salesmen, some of whom had something more to sell him than a fan only. They had a system for increasing his profits through better working conditions, but he could not see it.

One day at a meeting of the paper manufacturers' association he discussed with a number of other mill executives the questions of production, labor turnover, morale and like subjects which they were interested in.

This one executive found that he didn't know what production was from the standpoint of the up to date mill. Everything he did had to be forced instead of a free, easy method which brought much greater results.

He found that his mill had a reputation for being

a poor place in which to work. It was musty, damp and ill ventilated. The men were away from work a great deal because of sickness. When they were at work, they complained constantly about working conditions.

The management took these things as a matter of course. Brought up in the old school they thought a paper mill had to be an uncomfortable place to work in, just as in the old days the hold of an ocean liner was considered "a veritable hell" for the firemen. Men would kick and shift about anyway, so why try to make things any different.

After going over these things in detail with executives from other plants he woke up to the fact that his near-sighted attitude had cost his company considerable money. Aside from considering the human element he found that a better product was possible with less pushing but greater production.

Today this mill is run on an entirely different basis than formerly. Ventilating equipment has a prominent place and it is interesting to see what this equipment is accomplishing. Realizing that the methods of yesterday must be discarded, so far as ventilation is concerned, and that to keep up with the procession they must fall in line and adopt new ideas, this company, like many others, put in a system that brought results and accomplished what they were after.

A statistician stated recently that there are about thirty thousand printers in the United States and about seventy-five hundred of them are high grade printers. His estimate was probably a good guess, but it at least offers a start on the discussion of just how great a demand there is for high grade papers.

There are many practical and psychological reasons for a greater use of high grade papers. It would seem self-evident that to produce a really high grade job a printer should use high grade materials, especially paper, were it not for the fact, that, because of competition or fear of it, printers are everlastingly trying to produce fine work on poor papers. The quickest route to the waste basket lies through cheap paper and poor printing. Today through the notable work of a few far-seeing paper manufacturers paper occupies a higher place in the estimation of the buyer and good paper is surely in much greater demand.

The quality of the product depends to such a great extent on the quality of the workmen that one without the other is almost impossible. In other words, it takes high quality workmen to make high quality products, and the high grade man is not going to be satisfied with inferior working conditions which place him under a big handicap.

After all, the proper use of air in the mill is of greatest value in connection with your workmen. The human element counts big in the paper industry just the same as it does in other lines.

In order to get the most from your investment in men and machinery it is necessary to choose those methods which will improve conditions, not only for today but for tomorrow as well. The proper use of air in any plant makes for a better product and better profits.

Saving Man Power

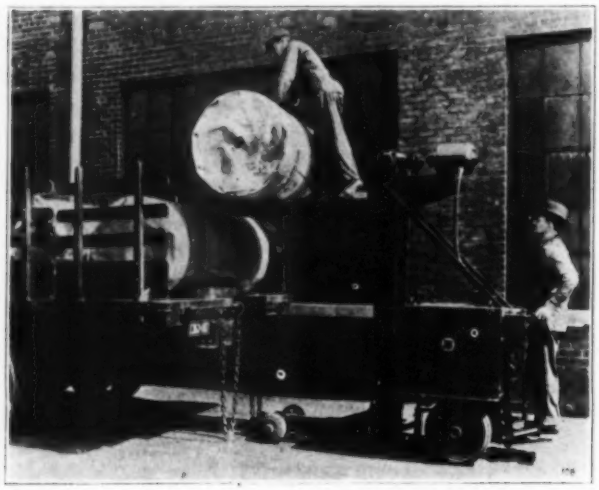
SEVERAL months ago we showed a number of illustrations of trucks handling paper, with some suggestion as to the advantage of using power trucks instead of hand trucks and brute force. The accompanying illustrations show a different type of power trucks from those used in the former issue, handling paper and board in both manufacturing and consuming plants.

The first picture illustrates a truck in use in the Hummel & Downing Company's mills at Milwaukee. These rolls of board weighing 1,300 pounds are delivered by an elevator to the upper floors for storage, and must be trucked an average distance of 200 feet. Formerly men with two-wheel hand trucks performed this work, and the rolls were tiered occasionally by the use of a hand tiering machine. By timing the speed of this hand operation, the men merely up-ending the rolls in a single tier, it was found that four men with a haul of 300 feet stored 40 rolls in two hours at a cost of ten cents per roll. With the truck illustrated which both carried and hoisted the rolls, the elevator is stopped high enough above the floor so that the paper can be rolled off on the platform of the truck, which transports the paper, two rolls at a time, to the desired point.

For the first tier, the rolls are up-ended, the method of doing this having been devised by the truck operator himself, who elevates the truck platform to a

height determined by experience, rolls the paper off at an angle until the roll overbalances and slides to the floor. The second and third tiers are reached by elevating the platform to the proper height and rolling the paper off, leaving the rolls on their sides.

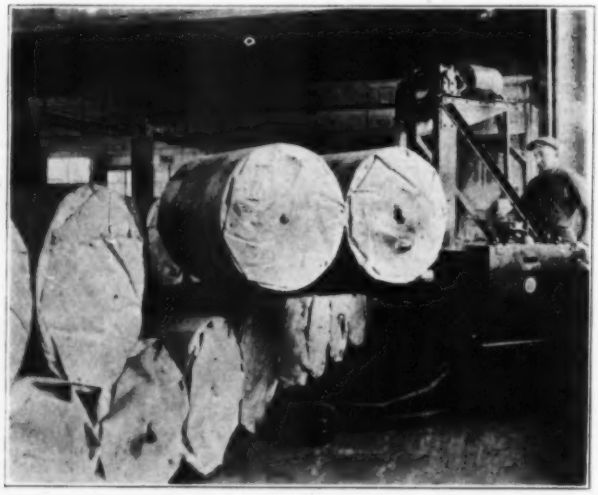
Under the same conditions as in the hand method,



one man using this type of truck was able to handle 90 rolls in two hours, at a cost of two cents per roll.

The second and third pictures illustrate how rolls of paper are handled in warehouses of the Detroit Free Press, and it is claimed it is making a saving of $25 per day and increasing the storage capacity to a considerable degree.

The fourth picture illustrates the method in the J. Manz Engraving Company in Chicago, receiving



and handling crated flat paper stock, and where it is claimed the reduction for handling this heavy material is more than 50 per cent. Approximately 50 tons of this paper are handled daily in and out of storage.

Formerly ten men were employed in handling paper stock for this company, seven taking it off the cars into storage and three out of storage to the presses. At that time hand trucks were used for moving the crates of paper and a portable elevator for piling. Under the new method, four men are employed instead of ten. The cost of electric power for charging the batteries of the truck averages thirty-seven cents a day.

It will be noted from one of these pictures, that this type of carrier handles many cases at a time, lifting up the whole pile and removing it to any desired point, or raising the load so that it can be piled on top of other cases, thereby using space to a much better advantage.

The ordinary paper mill, as well as in most cases where large quantities of paper are consumed, can no doubt improve their present methods of handling paper, and at the same time can save considerable of the money expended for this purpose.

Reply to a Comment

"IN THE November issue of The Paper Industry there appears a challenge by Mr. O. L. Berger to some statements made in my talk to a class in paper-making at Neenah, Wis., last January. I wish to make the following explanation in reply:

"The word 'calcium' is referred to as the base in the acid or the combined SO_2 and has no reference to the composition of the lime used in the making of the acid. The following sentence makes this quite clear where it says: 'If the lime content of the acid is too low, the cooking will have to be discontinued before all of the lignin is dissolved, etc.'

"There should be no misconception in the minds of those familiar with the sulphite process as to the effect of a too high or too low combined in the cooking acid because this is one of the conditions that needs constant watching if a uniform quality of pulp is to be produced.

"The Forest Products Laboratory makes my contention very clear. Read their bulletin No. 620 on, 'Effect of varying certain cooking conditions in the

production of sulphite pulp from spruce.' Table 3 on page 17 gives the results obtained when varying the amount of combined SO_2. Cook No. 99 having an acid that contained only .30% combined SO_2 cooked in 4.72 hours, whereas cook No. 71 with an acid of 2.09% combined and all other conditions constant required 7.75 hours to cook.

"I am greatly surprised that Mr. Berger takes exceptions to the statement that a high per cent of magnesium is essential for the better grades or pulp because the chemical properties of magnesium as well as calcium are so well known. Let us see what Mr. Sutermeister says in his 'Chemistry on Pulp and Paper Making.'

"On page 161 we read: 'Of the available bases for making sulphite liquor soda has the advantage of forming a stable bisulphite and the cellulose prepared with such liquor is very pure and easy to bleach. Magnesia possesses these qualities, but in a lesser degree, while lime is likely to make the fiber hard and harsh from formation of calcium monosulphite.'

"And, Mr. Cooper, in his paper on 'Sulphite Pulp Manufacture' (paper August 28, 1918, page 13), says: 'Although all the bisulphites act in general in the manner specified above the character of the liquid is modified in several important particulars, according as one base or another is in combination with the acid. Bisulphite of lime is a very unstable salt which upon being merely heated decomposes, one-half of the salt being set free. The resulting monosulphite is practically insoluble, so that when this decomposition occurs in the digester this latter salt is precipitated throughout the pulp from which it is difficult to remove by washing. Where lime liquor is used there is, therefore more gas pressure in the digester and the resulting pulp is harsh, hard and transparent. It is also more difficult to make a straight lime liquor of high test than it is to prepare similar liquors from magnesium or soda. Bisulphite of magnesium is somewhat more stable than the corresponding lime salt and its action on the incrusting matter is milder but even more effective. The sulphates or monosulphites which may be present in magnesium liquors remain in solution and are easily washed out from the pulp. The resulting product is much softer and whiter than any which is ordinarily made with lime without some subsequent treatment.'

"I admit that a fine quality of pulp is being made in Europe and that the pure calcium lime is being used, but they use indirect heating and their cooking time is from two to four times longer than ours.

"I am glad that Mr. Berger raised this question because the matter is of sufficient importance that it should be clearly understood and it would indeed be interesting to hear from those who have given the problem careful study.—P. A. Paulson."

Useful Information for Power Plant Owners and Engineers

By W. F. SCHAPHORST, M. E.

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Poor Belt Repairing

NOT long ago I was called to take a look at an oil driven engine which the owner wished to dispose of because it "gave him too much belt trouble." The owner admitted that the engine itself was all right. He could find no fault with it as far as its running ability was concerned, but, he said, "It breaks the belt as fast as I can fix it. I spend most of my time fixing the belt."

Of all the belts I have ever laid eyes on I never saw the equal to this one. I maintain that the above belt is the "most patched belt in the world." And I also maintain that it is the "most poorly patched belt in the world." The word "repaired" can hardly be used because it is too dignified a word in this case, and, besides, the belt wasn't repaired. It was just simply "patched." Originally, it was a double leather belt.

Whenever the belt would break the owner would simply take a piece of belting of the same width, lay it over the break, drive some rivets through, clinch the rivets, and let it go at that. No attempt was made to produce a smooth-fitting joint. No tapering down to a feather edge. No gluing. No squaring up with a square. The patch was simply laid on top, and, you might say, "nailed on."

Of course, the joint wouldn't hold long. Another splice would then be riveted on top of the other, the owner doubtless thinking that two splices should be twice as strong as one splice. And when that again would break, the owner "simply couldn't understand it." He decided that he would have to sell the engine and install a motor.

The entire belt, all the way around, was made up of splices in this manner, overlapping and underlapping one another until the average thickness was about equal to the thickness of three belts, one on top of the other. I regret very much that I did not have my camera along to get a photograph of the belt but I believe the reader who has had experience

with belts will have no difficulty in imagining what it looked like.

Never before has it been brought to my attention so forcibly that whenever a belt needs repairing it pays to do the job right in the first place. In this instance if the first repair job had been properly done it is quite possible that up to the present time there would have been no need for a second repair job. The joint of a leather belt that is properly scarfed and cemented is just as strong as the solid leather belt itself. Leather laced joints are of course never as strong as the solid leather, but if the owner had even laced his belt instead of riveting in this unworkmanlike manner he probably would have had much less trouble. Wire-laced joints are stronger than leather laced joints. They often have a joint efficiency of 85 to 90 per cent. A wire-laced joint could have been used as well as not and the writer believes it would have held.

How to Figure the Cost of Tight Belts

IN POWER transmission through belting we have some rather peculiar conditions to contend with. Run the belt tight and the bearings will consume too much power. Slacken the belt and it may slip and we then have the power loss due to belt slip, which amounts to one per cent of the power for each per cent of slip.

With a given belt, then it may be possible to permit slip to some extent and still save power by running the belt rather loose. But, again, by permitting slip, we are permitting our belts to wear away faster, and the cost of belt renewal may amount to considerable.

It is evident, then, that the ideal condition is to run belts slack if possible, at the same time preventing slip. This condition is possible and is being successfully accomplished these days by means of proper belt care. The belt is not allowed to become hard and dry, for then it will slip even when pulled up tight. Belts must be kept nice and pliable. They then come in contact with the pulleys properly, exclude all air, "take hold" of the pulleys, and greater area of belt contact is the result.

To emphasize the value of running belts properly, I have developed a formula which gives the money saved per year by converting a tight, slipping belt drive into a loose, nonslipping drive. This formula includes the cost due to power absorbed by the journals and the power lost through slip. It does not include the cost of belt wear, though, as that is a factor that cannot easily be computed mathematically, if at all. Here is the formula:

Cost per year in dollars=

$$\left[\frac{W\ V^2\ (T_a - T_b)}{17{,}688\ T_a\ T_b} \times \frac{S\ P}{100}\right] C\ N\ D$$

where

W=Weight in pounds of the engine fly wheel;

V=Velocity in feet per second of the periphery of the fly wheel while running at normal speed;

S=Per cent of belt slip saved due to belt care and improved methods. For example, if the belt slipped 4 per cent while running tight and 2 per cent while running slack, the saving would be (4 minus 2 equals 2) 2 per cent, which should be used in the formula.

P=Horse-power of the engine.

C=Cost of power in dollars per horse-power hour.

N=Number of working hours per day.

D=Number of working days per year.

T_a=Time in seconds required for the engine flywheel to come to a dead stop after shutting off steam or gas. The steam or gas should be shut off as quickly as possible. Engine should be driving the belt and pulleys only and driven machinery should be thrown off of the line if possible, in order not to interfere with the test. T_a, then, is the time required to come to a stop with belt running slack.

T_b=Time in seconds required for the flywheel to come to rest with belt running tight.

It is evident that T_a will be greater than T_b, because with the lessened power consumption of the bearings it will take longer for the stored energy in the flywheel to be consumed.

This formula requires at least four tests: First, the belt slip while running tight; second, the stopping time while running tight; third, the belt slip while running slack, and fourth, the stopping time while running slack.

Should it be found that there is more slip when running slack than when running tight, the value $\frac{S\ P}{100}$ would be negative, and it may be found that the advantages of slack running are lost. Whatever happens, this formula will tell the truth.

Let us choose a concrete example, where:

W=3,000 pounds.

V=a mile a minute=88 ft. per sec.;

S=3 per cent;

P=200 h. p.;

C=$.015;

N=12;

D=300;

T_a=180 seconds;

T_b=150 seconds;

$$\left[\frac{3{,}000 \times 88 \times 88 (180 - 150)}{17{,}688 \times 180 \times 150} \times \frac{3 \times 200}{100}\right] \$.015 \times 12 \times 300 = \$472.$$

A saving of four hundred and seventy-two dollars per year should make a test like this well worth the while of any power plant engineer.

Is Castor Oil Good for Belts?

A WRITER on power subjects recently wrote this in a well known trade paper: "The belt should be run about half speed and an occasional application of castor oil should be made to its face to limber it up."

While it is true that castor oil is better than nothing at all, the writer is unable to understand why castor oil is so frequently recommended for application to belts when it has been proven time and again to be harmful to the belt fibers. What is more, it does not prevent slip as well as the treatment made especially for belts.

The writer has in mind a 12-inch belt which connected a 4-foot driving pulley running at 213 revolutions per minute to a 14-inch driven pulley. This belt drove a 682 light dynamo and even when treated with castor oil, had to be run very tight with a man constantly at hand to prevent slipping off the pulleys. When a belt slips, the lights, of course, are bound to flicker. Later on, a belt treatment made especially for belts was applied and the drive was so improved that an 850 light dynamo was substituted for the 682 light dynamo. In spite of the 25% load increase, the same belt now runs quite slack, does not slip, and requires no attention.

Castor oil is gummy. The gum in solution is carried in and among the belt fibers as far as the oil penetrates. The liquid parts of these oils slowly dry out and leave the gummy element which continues to stiffen and sooner or later becomes hard enough to crack. When these elements do crack, the belt fibers crack with them. This explains the fine transverse cracks, particularly across the back of the belts which have had initial or subsequent treatment with castor or linseed oil. It is these same gummy elements that make a belt so treated look slick and smooth, and, in a measure, lessen its tendency to slip. Both of these oils also decompose into harmful fatty acids. Proof of the decomposition of castor oil is obtainable by placing some in an uncorked bottle, setting this in strong sunlight or in a warm place and in time observing the changed appearance.

Cases are on record also where castor oil has caused leather belts to rot. By saturating a piece of leather belt with castor oil and placing near a radiator or other warm place, it will be found that the castor oil will decompose and will then attack the leather, causing it to become so weak that it can be easily torn with the hand.

It is therefore evident that in the end, treatment of belting with castor oil is uneconomical. It may not cost as much per pound as a treatment made especially for belts, but the writer certainly does not recommend castor oil.

How to Figure Balata and Fabric Transmission Belts

THE question is often asked: "How can I figure fabric and Balata belts? I see all kinds of rules for leather belts but I seldom see anything about fabric belts."

In reply I have the following to offer. I have avoided the use of formulas and tables entirely in order to simplify the method as much as possible. Formulas and tables are often very vexing.

Balata Belts

Let us suppose that you want to figure the width of a Balata belt necessary to transmit a given horse power. Proceed this way: Subtract one from the number of piles, multiply by the diameter of the pulley in inches, multiply by the number of revolutions the pulley makes per minute, then multiply by 0.000158 and then divide the result into the horse power to be transmitted. The answer is the width of the belt in inches. If you get 1.8 inches for the answer you will very likely decide on a two-inch belt in order to be safe, which is the right thing to do. If you get 2.01 for an answer you will decide that a two-inch belt will do the work very capably and you will be right because these rules allow for an ample factor of safety. This rule is usable for Balata belts of 3, 4, 5, 6, 7, 8, 9, or 10 ply.

Fabric Belts

Now for fabric belts. The rules as ordinarily given for fabric belts made up in plies are something like this—"A 4-ply stitched canvas belt is equivalent to a single leather belt. 8-ply is equivalent to a double leather belt. And so forth."

Then after knowing the equivalent we have to hunt up our rules of thumb for leather belts before being able to decide on a width necessary for a given drive.

Here is a rule which gives the direct answer without even thinking of leather. The rule applies to most ordinary belts made up in plies such as rubber and stitched canvas. Divide 2640 by the number of plies and to the quotient add 136; then divide the result into the speed of the belt in feet per minute; and then multiply that result by the width of the belt in inches. The answer is the number of horse power that the belt will transmit.

For example, what horse power may be transmitted by a 10-ply canvas belt whose width is 6 inches and whose speed is 4,000 feet per minute? Substitute in the rule just given above and you will find the answer to be 60 horse power.

To find the width of a stitched canvas or rubber belt, proceed this way: Divide 2640 by the number of plies and add 136 to the result, then multiply by

the horse power to be transmitted and then divide by the speed of the belt in feet per minute. The answer is the width in inches.

To find the speed at which a stitched canvas belt may be run, knowing the horse power and width, proceed in this way: Divide 2640 by the number of plies as before and add 136; then miltiply by the horse power to be transmitted; and then divide by the width of the belt in inches. The answer is the speed in feet per minute.

To find the number of plies to specify, knowing all other factors, proceed in this way: Multiply the width of the belt in inches by the speed of the belt in feet per minute and divide by the horse power to be transmitted; then subtract from that the number 136; then divide the result into 2640. The answer is the number of plies.

Speed

To find the speed of a belt, knowing the diameter of the pulley and the revolutions per minute—Multiply the diameter of the pulley in inches by 0.262 and the result by the number of revolutions per minute of the pulley. The answer is the speed of the belt in feet per minute.

To find the number of revolutions per minute that will be made by a given pulley, knowing the speed of belt and diameter of pulley, proceed in this way: Multiply the diameter of the pulley in inches by 0.262 and divide the result into the speed of the belt in feet per minute.

The answer is the number of revolutions per minute.

To find the diameter of pulley, knowing the speed of belt and the revolutions per minute, proceed in this way: Multiply the number of revolutions per minute of the pulley by 0.262 and divide the result into the speed of the belt in feet per minute. The answer is the diameter of the pulley in inches.

Why Not Weigh Your Ashes?

DO your ashes weigh more this year than they did last, or do they weigh less? Have you ever weighed the ashes that drop through the grate bars of your furnace?

It may seem like a ridiculous thing to do, on first thought, because—of what value are ashes? We are usually told to weigh the coal burned and to keep a strict amount of all water used in the boilers so as to determine whether or not we are getting the same good grade of coal that we always got. But a simpler method is to weigh the ashes. It is the ash content, usually, that determines the calorific value of a coal. Very often coal from the same mine shows a widely differing ash content, so it is well to keep tab on the refuse which costs you as much per pound as the good combustible matter.

Perhaps, also, a little experimenting along this line will do your plant some good. Try different coals of the size suitable for your furnaces and grates and the one with the least ash content which sells at a low price should show pretty good results. Later this can be "doublechecked" by noting how well the coal evaporates the water. It is not difficult to work out a method that will tell you, year in and year out, just how well your coal and boilers are performing.

Bare Pipe Heat Loss Cost

BARE steam pipes have been preached against ever since the time of Watt, yet the bare pipe is still with us and losing money for its owner. Why aren't all pipes covered? Every steam pipe of any importance and size should certainly be covered unless it is a radiator pipe and is intended to radiate heat, or unless it is an exhaust pipe or something of that sort. Perhaps the reason why owners are so slow to cover and insulate piping is because they regard the idea as being mostly "theory" and that in practice the actual money loss doesn't amount to much. Perhaps "money loss" hasn't been brought to the attention of the owner clearly enough—forcibly enough. And the reason why this has not been done is because we have not had enough information on the subject. We have not had a good reliable formula that would tell quickly how much money was being lost through heat in 10 hours, or in 100 hours. In the 1915 Proceedings of the American Society of Mechanical Engineers, however, I find some good information on the subject. L. B. McMillan made some reliable and thorough tests by means of an electrical method and plotted his results in the form of a curve. I have used his results, therefore, in order to develop a trustworthy formula—a formula that will handle any ordinary case of heat loss from bare pipes. Then, with the formula as the basis I constructed the alignment chart which I show here. In using the chart it is not necessary to do any figuring. Simply lay a straightedge across the chart four times as indicated by the dotted lines, and the cost of the heat loss is immediately found in the right-hand column.

This is the formula:

$$\left.\begin{array}{l}\text{Cost of lost heat}\\ \text{in H hours}\end{array}\right\} = \frac{(1.6 + .0056\ D)\ D\ HAC}{2{,}000\ B\ E}$$

where

D = the temperature difference in degrees F., or the pipe temperature minus the room temperature.

H = the number of hours during which heat is lost.

A = area of bare pipe in square feet.
C = cost of coal per ton of 2,000 pounds, in dollars.
B = B. T. U. per pound of coal.
E = boiler efficiency.

For convenience I have used these same letters to designate their various columns in the chart. For example, take a case where we have these values:

C = $3.50
A = 100
D = 200
H = 200
B = 12,000
E = 60 per cent

What is the cost of the lost heat?

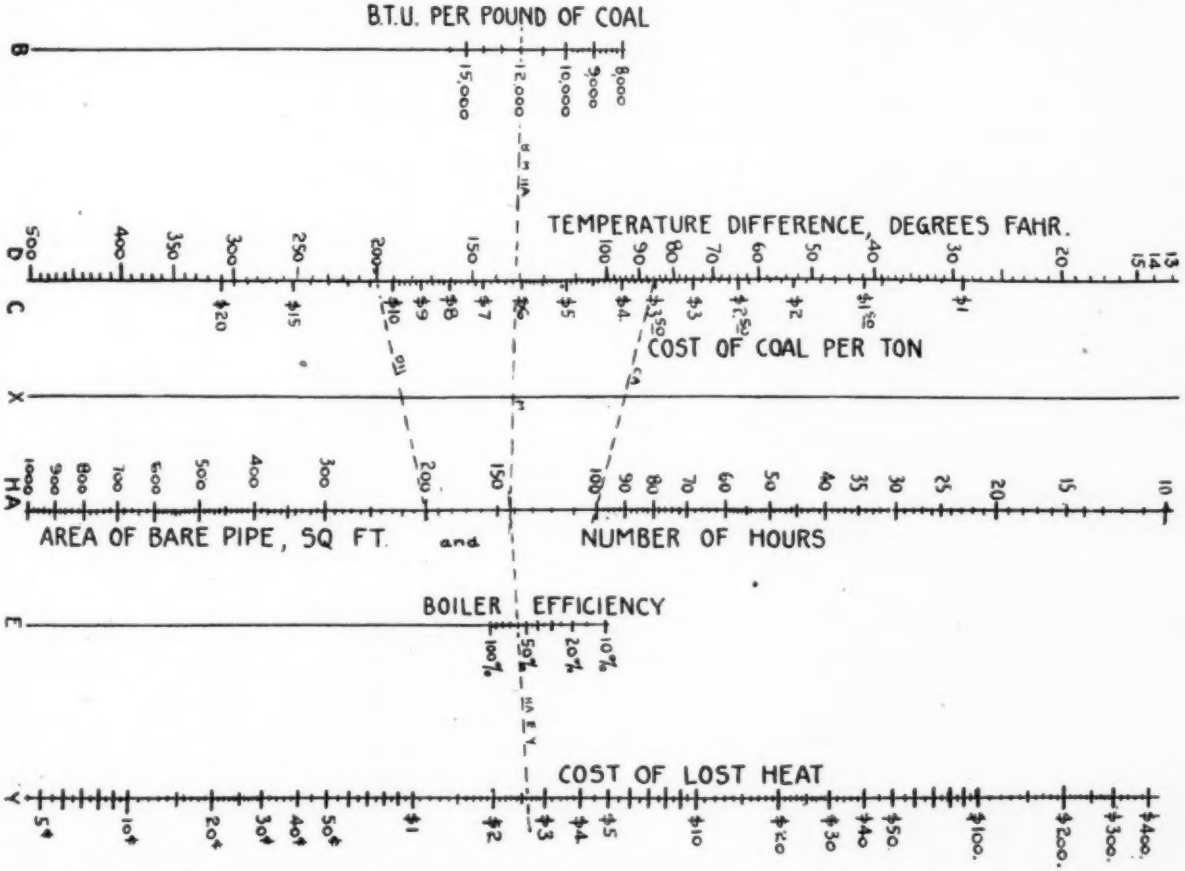
The dotted lines drawn across the chart show how the answer—$2.64—is obtained in column Y at the extreme right. Connect C and A with line CA and locate the intersection with column X. Then connect D and H with line DH and locate the second intersection with column X. Now locate the midpoint M between these points of intersection and lay out the line BM HA, locating the intersection with column HA. Lastly, run a line through that point of intersection and the 60 per cent (column E)—line HA E Y—on the chart—and the final intersection with column Y gives the answer, $2.64.

By following this method any ordinary problem is easily solved. If the number of hours were 2,000 instead of 200, the selfsame lines shown would be used and the decimal point would be moved one place to the right, making the cost $26.40 instead of $2.64. And if, in addition the area were 1,000 square feet instead of 100, the decimal point would be moved one more place to the right, making the cost $264. The range of the chart is therefore decidely wide. It includes temperature differences all the way from 13 degrees F. to 500 degrees F., all heat values for coal and a boiler efficiency range from 10 per cent to 100 per cent. I have included 100 per cent efficiency, because we are gradually "getting there." The recent record of 90 per cent brings us very close to the point of desired perfection.

This chart, therefore, shows distinctly the money loss through bare pipes. Its aim is to influence the owner to cover those pipes. It is true that pipe covering will not save all of this money, but it will save much of it. The proportion of money saved depends entirely upon the efficiency of the covering. No covering made is 100 per cent efficient, but that efficiency is closely approached.

For example, let us cover the pipe "solved" above, whose area is 1,000 square feet, which is heated for 2,000 hours. Let us use a covering whose efficiency is 80 per cent. How much money would be saved in the 2,000 hours, or 83.3 days? The answer is

$264 × 0.80 = $211.


B.T.U. PER POUND OF COAL
TEMPERATURE DIFFERENCE, DEGREES FAHR.
COST OF COAL PER TON
AREA OF BARE PIPE, SQ FT. and NUMBER OF HOURS
BOILER EFFICIENCY
COST OF LOST HEAT

A Handy Chart for Determining the Collapse Resisting Strength of Iron Pipes and Tubes

This chart is based upon the well known formula given in a number of handbooks.

$$P = 9{,}600{,}000 \frac{T^{2.18}}{L\ D}$$

where P = the collapsing pressure in lbs. per sq. in.,

T = thickness of metal, in inches,

L = length of pipe in inches,

D = outside diameter of pipe in inches.

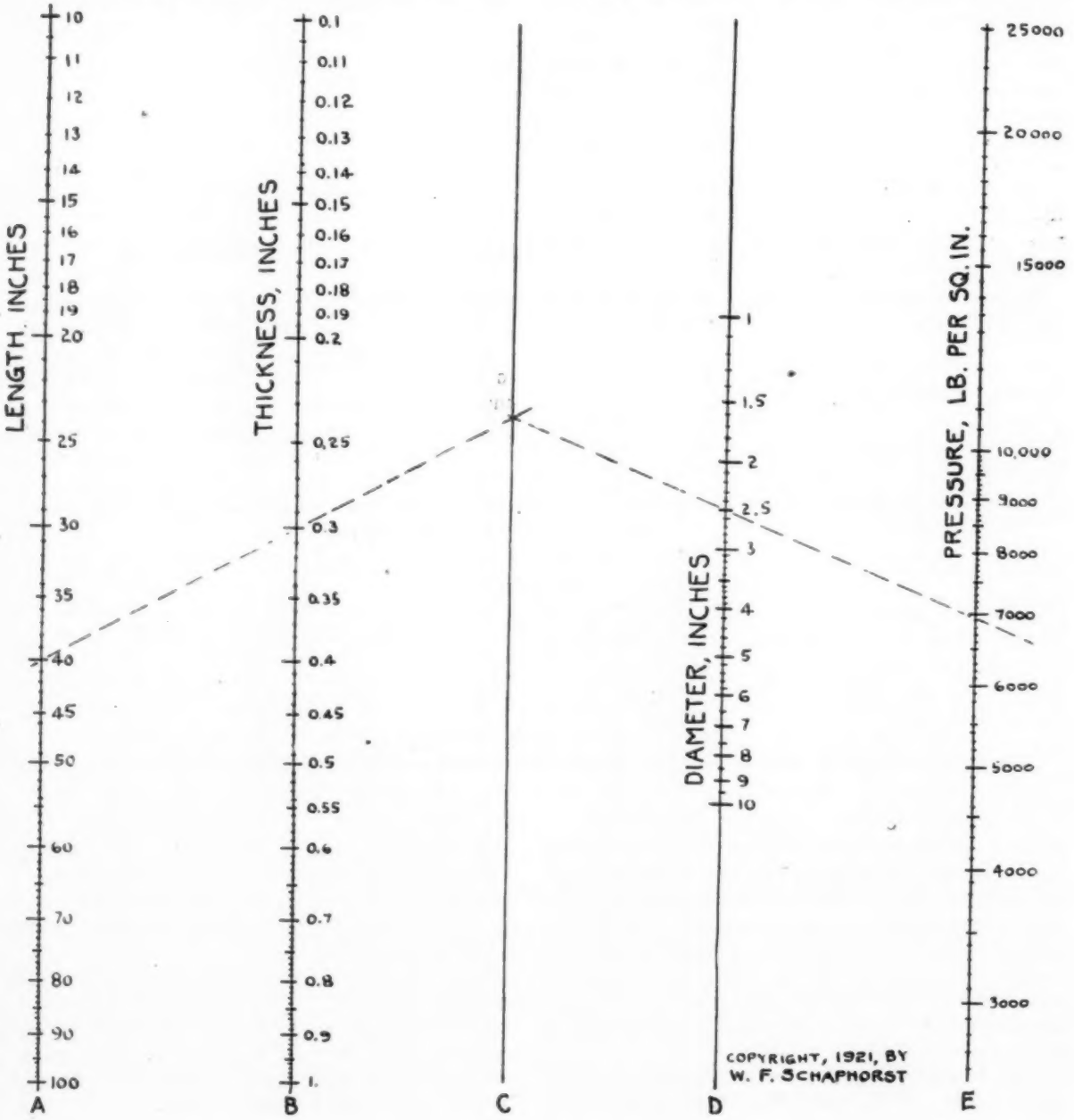
This chart is intended for use wherever piping is subjected to an external pressure which has a tendency to collapse the tube or pipe.

It is convenient because it does away entirely with computations. Simply lay a straightedge across the chart twice and the result is found.

The dotted lines, for example, solve this problem:

What external pressure will a 2.5 inch pipe safely withstand whose length is 40 inches, and whose thickness is 0.3 inch?

Run a straight line through the 40 (column A) and the 0.3 (column B) and locate the intersection



with column C. Then from that point of intersection run through the 2.5 (column D) and the intersection with column E gives the result—about 6,950 pounds per square inch.

The chart can be used with equal ease for determining any one of the factors—length, thickness, diameter, or pressure—where the other three are known. Thus if we wish to determine the thickness of pipe necessary to withstand a pressure of 6,950 pounds per square inch, where the pipe diameter is 2.5 inches and the length 40 inches, the same dotted lines would show the thickness (column B) to be 0.3 inch.

The Advantages of Steel Pulleys

STEEL pulleys are being more rapidly adopted now than ever before. They have many advantages over other pulleys—cast iron, wood or paper—and these advantages will be considered for the benefit of those who are interested in belts, pulleys and power transmission.

The thing that should be most sought in any kind of power transmission project is "greatest ultimate economy." This is a very broad term, for it includes not only the first cost of the belts and pulleys, but the up-keep, life, slip, dependability, and even the cost of coal fire into the boiler furnaces.

Pulleys should first of all have a high coefficient of friction so that the belts running upon them will not slip. They must be strong enough to resist collapse in case of sudden overload or in case the belt catches and breaks. They must be made "true," as a wabbling is always unsightly and generally a symptom of inefficiency. The surface of the periphery must not be rough, for belts are bound to slip somewhat ("creep" is the correct word, and it usually amounts to about 1.5 to 2 per cent of the total belt travel), and when a belt slips on a rough pulley, premature wear is inevitable. Slip also generates heat, and since heat is undesirable in belts, causing them to burn, get dry and crack, it is clear that the pulley should be made of some material that will conduct the heat away quickly and radiate it into the atmosphere. A "cool pulley" is desirable.

From my own personal experience with belts and pulleys, I conclude that the "rough" surface has no advantage over the smooth surface. Belts running over rough pulleys must necessarily creep just as much as where they run over the smooth steel pulley. I, therefore, prefer the latter. There is very little difference in the pulling qualities of the different pulleys at ordinary loads.

Steel pulleys are also strong enough to resist collapse, and in extreme cases where one might collapse in spite of its great strength, there is no flying to pieces to endanger the workmen, for the ductility of the metal prevents such failure. This is a strong point for the steel pulley on the "safety first" side of the ledger.

As for "trueness," after the forms and dies are once made, all the steel pulleys are just alike. They are all true, smooth, strong, balanced and virtually faultless.

It is well known that steel is a capable conductor and radiator of heat. Steel is used in steam boilers almost exclusively, not alone because it is a good heat conductor, but because it is so strong, ductile and durable. The same reasons make steel well adapted for pulleys.

Steel does not swell or shrink. This is an advantage over wood and paper for pulley construction. Hence, when a steel pulley is once screwed into position there will be no slipping on the shaft, as often happens where wood pulleys are used. It should always be remembered that in a main belt drive, where one of the pulleys slips 1 per cent, 1 per cent of the fuel will be lost thereby. If both pulleys slip the same amount, the total slip will be 2 per cent, therefore 2 per cent of the fuel is lost. And the same applies to the periphery of the pulley. Each per cent of a slip is equally wasteful there.

Steel has no "grain," such as wood has, and therefore it doesn't warp or split. Bolts in the hubs or steel pulleys can be placed almost "anywhere" for the sake of clamping power and get-at-ableness. In wood and paper pulleys the structure of the grain must always be considered. Also, it might be noted, steel is not troubled with knots. Steel is noncombustible. Where it is desired to make the mill as fireproof as possible, this is of far-reaching value.

Steel pulleys are light. They do not weight down the shafts with useless mass and eat up power unnecessarily in that way. In drives that must be reversed frequently lightness is particularly desirable. However, it can be almost universally stated that light pulleys are always desirable, provided they are strong enough. Of course, any steel pulley as made by present-day responsible manufacturers is strong enough for the work for which it was expressly made.

Cast iron has a few advantages over wood, of course, but steel has every advantage of cast iron and many more for pulley construction. Cast iron pulleys weigh more than twice as much as steel pulleys of the same power. Wooden pulleys are no lighter and are generally inferior.

Occasionally we see steel pulleys that have been covered with leather to "make a better pulling surface," but, as stated above, I am opposed to such practice. I am even opposed to painting the pulley surface because it is the belt that "catches it" when it comes to wear, and belts, you know, are pretty expensive.

It is important, in belt transmission, to maintain as large an area of contact as possible between the

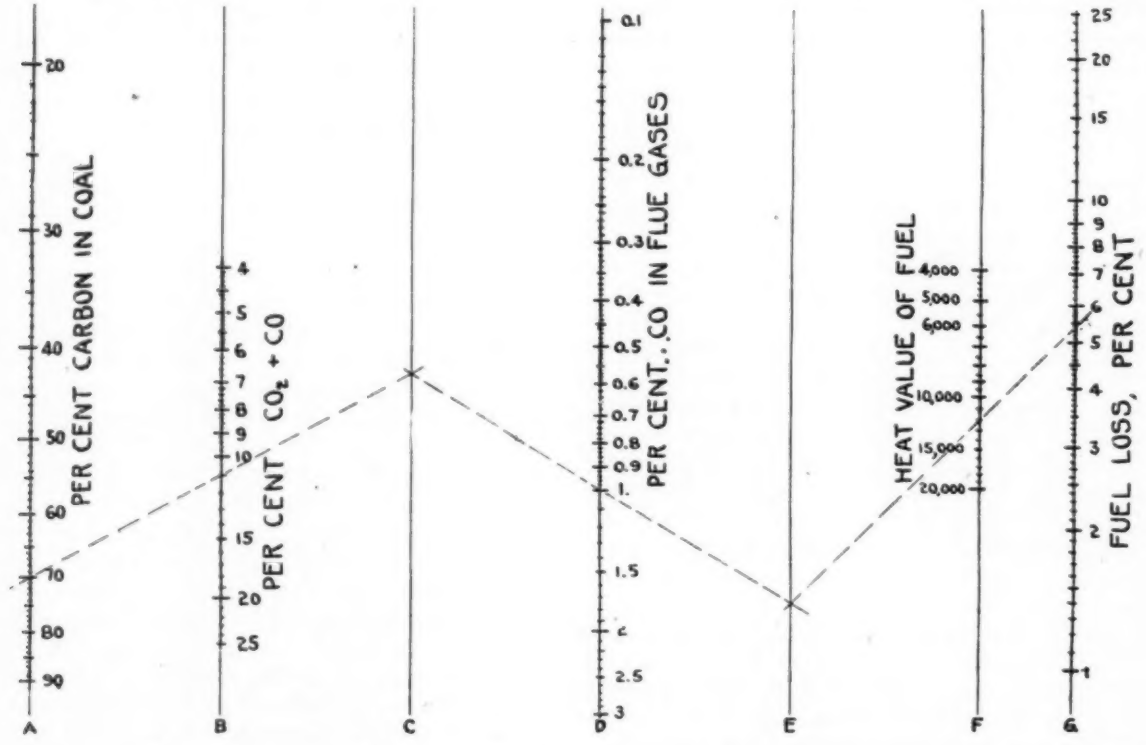
belt and the pulley surface. If the pulley has a number of "bumps" on it, these bumps will naturally lift the belt up off the smooth surface and the contact becomes imperfect. Painting makes the pulley rough and "bumpy" and the area of contact is therefore diminished. This results in slip to a more or less marked degree.

Where the "bump" is a cutting edge, the belt will inevitably find itself cut to pieces, not through slip, but through creep, for creep cannot be eliminated and the effects of belt creep on a rough cutting surface are as disastrous as slip.

For these reasons, then, I prefer the smooth face of the steel pulleys. Don't use leather covers, canvas covers or any other covers or paints, unless the speed of the pulley is very slow. It is only on extremely slow speed pulleys that coverings can be or should be recommended.

What Are Your Fuel Losses Due To?—Too Much Carbon Monoxide?

THIS chart gives the fuel loss due to too much carbon monoxide in the flue gases. To determine the loss no figuring is necessary. Just zigzag a straightedge across the chart three times as indicated by the dotted lines and column G immediately gives the per cent of fuel loss.



For example, a given coal contains 70 per cent of carbon; the flue gas contains 10% carbon dioxide (CO_2) and 1% carbon monoxide (CO); the heat value of the coal is 12,000 B.T.U. per pound. What is the fuel loss?

Run a line through the 70 (column A) and the sum of CO_2 and CO (column B) and locate the intersection with column C. From that located point run through the 1% (column D) and locate the intersection in column E. From that point run through the 12,000 (column F) and the intersection with column G shows the answer—5.4%. The operation is the height of simplicity for the line is carried directly across from left to right; there is nothing confusing about it.

The range of the chart is wide enough to take care of nearly every condition of flue gases. Should the intersection with columns C or E fall "outside of the chart" it will make no difference. Merely extend the line C or E, whichever it may happen to be, and go ahead with the problem.

A little study given to the chart, coupled with a few examples of your own making, will soon show why the percentage of CO should be as low as possible and why the CO_2 should be high.

If it is desired to compute the percentage of fuel loss without using the chart it may be done in this way. Divide the percentage of carbon in the coal by the percentage of $CO_2 + CO$; multiply by the percentage of CO; divide by the heat value of the coal per pound; and multiply by 10150. The answer will be the same as given by the chart. The chart, of course, is much quicker.

Reason of Defective Sizing

By E. ARNOULD

Translated from "Le Papier," XXIV, 108-110 (March, 1921)
By A. Papineau-Couture

IT HAS frequently been noticed that in paper mills which have exceptionally pure water supply, the sizing suddenly goes wrong for a certain time and then becomes normal again, and that this is merely transitory in some cases, while in others it recurs periodically. This is attributed by the mills to various causes:

1. Quality of the rosin soap.
2. Changes in the nature of the water.
3. Carelessness in carrying out the sizing operation.
4. Presence of a certain amount of pulps which resist sizing.
5. Excess of mineral loading material.
6. Presence in the beaten pulp of certain substances which act as solvents of rosin.

Like everybody else, we have experienced some of these disagreeable surprises; but on close investigation we were nearly always able to trace the trouble to its source and to make such changes as were necessary to obtain normal sizing once more.

We admit that the proper sizing of paper depends essentially on the chemical reactions which take place on treating the pulp with the size; but any change in the condition of the chemicals used may affect the course of these reactions. Some experts claim that certain reactions, which have not as yet been given a satisfactory scientific explanation, are too mild to have any bearing on the mechanism of sizing. And nevertheless it has been noted that in practice they absolutely present a satisfactory sizing. We shall study such a case.

Several paper mills which have exceptionally pure water supplies find that they cannot size their paper by the usual means when their furnish contains a considerable amount of certain bleached wood pulps. An examination of the pulp reveals the fact that it has been wetted by sea water. The portions which have been stained by water contain as much as 1.820 kilos of sodium chloride per 100 kilos of pulp, while unstained portions of the same bales show from 0.43% to 0.263% of chloride.

The irregularities in sizing cannot be attributed to any other cause than to the action of these very small amounts of sodium chloride on the solutions of rosin size and of sulphate of alumina. Such irregularities seem to us to be of a purely chemical nature, as the reactions which take place cause a partial dissociation of the colloids present. If we are mistaken, we are quite willing to admit any other explanation which really explains all that takes place in such a case. In the meantime we must have the courage of our convictions and we consider it our duty to make others benefit by our investigations.

The reactions which take place when a solution of aluminium sulphate is mixed with a solution of rosin are entirely different from those which take place during the sizing of pulp. In the first case the reactions are similar to those of acids on bases, bases on salts, and salts on salts; there occur double decompositions and precipitations according to well-known laws. But during the sizing of pulp, various other factors can come into play and entirely change the course of the reactions. As the result of a long experience with and close observation of rosin sizing, we have found that the nature and purity of the pulps used and the presence of acids, salts, or excess of bases in the reaction medium affect the action and reactions of the colloids on one another.

According to chemists who are familiar with the action of crystalloids on colloids, the traces of chlorides adsorbed by chemical pulps during bleaching causing the formation of dense hard precipitates which modify the mechanical action of the chemicals used in sizing.

Of course the case mentioned above is not the same as when the water supply becomes contaminated owing to infiltrations of sea water or of water from saline springs; but the results are practically the same in both cases. The former case, however, is worse than the latter, for in one mill which was subject to this contamination of its water supply it was found that by increasing the amount of sizing, reducing to 3% the amount of sulphate of alumina, and adding a slight excess of acid, the paper could be sized in a satisfactory manner. Unfortunately, the sizing thus obtained was not permanent; in the course of time either the hygroscopicity of the paper or the retroactive effect of traces of acids, chlorides or other salts, destroyed the sizing.

Up to the present time we have not been able to find a plausible explanation for this trouble nor a satisfactory solution to the problem of sizing paper composed largely of wood pulps containing sodium chloride. Where can these chlorides come from, unless it be from an improperly carried out electrolytic separated from the pulps? Opinions which we obtained from various sources, investigations which we carried out along various lines, and accurate bleaching?* Is it reasonable to suppose that after bleaching with sodium hypochlorite, acids or antichlors were used and that to these chemicals must

* In France "electrolytic bleaching" is applied to bleaching by means of sodium hypochlorite.—Translator.

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be ascribed the presence of traces of adsorbed chlorides? Can these chlorides be dissolved out and analyses which we made, far from furnishing a solution to the problem seem to make it, if anything, more complicated, for they apparently give theoretical results which are in direct contradiction with those obtained in the course of practical tests. The reason for this lies in the fact that the relations of colloids to crystalloids are but little known.

And yet the problem is quite simple: in a certain mill, when using bleached pulps that are pure, sizing is quite normal with 3% rosin and 6% sulphate of alumina, while with pulps containing 0.050% to 0.263% of sodium chloride it is impossible to size the paper, even when the amount of chemicals is doubled.

An eminent chemist to whom we submitted the question expressed his opinion as follows:

"Cellulose and rosin size belong to the class of substances known as colloids; they are entirely different from crystallizable compounds and have chemical idiosyncrasies, so to speak; they react with other colloids in a very peculiar but definite and known manner. When we come to consider the reactions of colloids and crystalloids, the matter is still more involved, for we must consider not only the nature of the crystalloid, but also the nature and origin of the colloid."

In the case under consideration, nothing can be forecasted; for the cellulose colloid adsorbs the crystalloid and fixes it in such a manner that prolonged and repeated washings cannot remove it.

Absorption is a chemical phenomenon, the absorbed substance disappearing in the absorbing medium; but adsorption is a physical phenomenon. For instance, in dyeing, the coloring matter is adsorbed by the textile, and in the problem under consideration the sodium chloride which is present during bleaching is adsorbed by the cellulose.

When the rosin size is added, the chloride seems to have been freed from the pulp (probably by the beating), and it acts as a precipitant for this new colloid. Strangely enough, it is useless to add a further amount of size, as the decomposition and precipitation will repeat itself. In this case the law of mass action cannot be relied upon to obtain the desired result.

We consider it inadvisable to try to dissolve out these chlorides by means of sulphuric acid. The latter can act only at a relatively high concentration, and if it is not completely eliminated by very prolonged washings there will remain traces of hydrochloric acid which will later regenerate sodium chloride. Washing with pure water is not efficient, and we would advise dissolving out the chloride by means of a dilute caustic soda solution which must then be removed by a thorough washing.

Patching Boiler Settings

THE life of boiler settings can be prolonged by careful attention when opportunity affords. Small cracks or open joints if attended to before the brick or tile become loosened will save a more serious repair job.

Large patches and other repairs using Hytempite as a binder for crushed fire brick or special granular refractories have been successfully made on many types of furnaces. These patches are troweled on and the surface of the patch coated afterwards with diluted Hytempite.

All boiler settings will develop weak spots sooner

Figure 1

Figure 2

A completely equipped, central analytical laboratory where chemical control work on experimental and plant processes is carried out.

ANALYSIS

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or later. The average operating engineer realizes that a well applied patch with the proper materials may save a lengthy job of reconstruction—and a shutdown.

Many attempts have been made to repair side walls and arches of boiler settings. The results have often proved a failure and the operating engineer has been discouraged in his efforts to make a patch that will stay put.

A method of patching which has proven very successful in a number of central station and industrial plants is described and illustrated here.

Patching suspended horizontal surfaces or flat arches and the filling of deep and extended abrasions in side walls have been made with recognized success by using this binder for the refractory filling. Successful patches have been made even in cases where six feet square of the side walls have been eaten away six or eight inches deep. The brick work has been restored to its original thickness and the patch has stuck.

Where brick has spalled in the arch, the crevices have been filled and the arch restored to original alignment.

Hytempite requires no heat to effect a bond so that the newly applied patch can be built up in the crevice or hole and becomes an integral part of the structure.

Success in this work depends on the method of application as well as on the materials used.

As illustrating the bad condition of bridge wall and side walls, note figure 1. Some of the bridge wall is entirely gone and much of the brick work loosened or badly eroded. Figure 2 was taken when patching was partially completed to show the method of application. The mason is applying the patching material to the side wall, having finished the arch and bridge wall.

In applying the patches, the clinker was first removed and the surfaced chipped and nicked until most of the glass was gone and the original texture of the brick exposed. Care was taken in this work so that the bricks were not loosened. Then the entire surface to be patched was brushed until free from dust.

This surface was then well saturated with a thin milky wash of Hytempite and water as a primary coat which was quickly absorbed by the exposed brick surface.

The foundation for the patch consisting of a somewhat thicker mixture was then applied as a bonding coat. Where the surfaces were large, this was done in sections so as to insure a moist surface for applying the patching mixture.

The patching material consisted of diluted Hytempite to which Carbosand was added gradually until thoroughly mixed. The consistency was such that no free moisture showed when the mixture was squeezed in the hand.

Care was taken to apply the patch while the foundation coat was still moist. The dark portions of the patching as seen in the background of figure 2 show the method of applying the patch to a large surface by plastering on a small section at a time.

After the patching was completed on all large and small surfaces, it was allowed to set for about an hour before applying a final surfacing of the same mixture as used for the bonding coat. The object of the final coating was to fill pores and small voids and give a smooth surface that would resist pitting action of flames and hot gases.

This method of patching is being used by many power plants in New England, Ohio, Michigan, Indiana, Kansas, Iowa and Canadian provinces. The photos shown were taken in a large power plant in the Middle West.

Handling Liquid Chlorine

By D. K. BARTLETT

Vice-President, Electro Bleaching Gas Company

CHLORINE in liquid form has now been used in this country since 1907. In common with all other compressed gases there are very definite and careful regulations drawn by the I. C. C. governing its transportation. Under these regulations there are four accepted containers in which the material may be moved, namely, those which carry 100 lbs., 150 lbs., 2,000 lbs., and 30,000 lbs. As there have been no accidents in Interstate Commerce since the regulations have been in force it would seem proper to assume that the regulations are right, as they now stand.

The use of chlorine has become very widespread through the textile industry, the public water supply system, the flour industry, the chemical industry, and the pulp and paper industry. Liquid chlorine is today stored in from 4,000 to 5,000 different points in quantities of from a few cylinders to many thousand pounds. So far such regulations covering storage as have been in force are simply those recommended by the producer to the consumer. Safety is of prime importance to the producer as well as the consumer, and while the hazard is much less than is commonly supposed, it is, nevertheless, sufficient to cause the producers to adhere to and recommend regulations which make the use of this material safe.

It may be well at this point to consider briefly the hazards of compressed gases in general.

As long as the gas remains in the container, it is obvious that it can do no harm, irrespective of its

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effect when released. It is therefore necessary to consider the probability of escape of gas from the container, as well as the qualities of the gas itself. An escape of gas from a container may be due to—

A. A true explosion.

B. An increase of pressure, due to heat, sufficient to rupture the container.

C. Leaks.

If the gas escapes from the container, the resulting hazard may be due to—

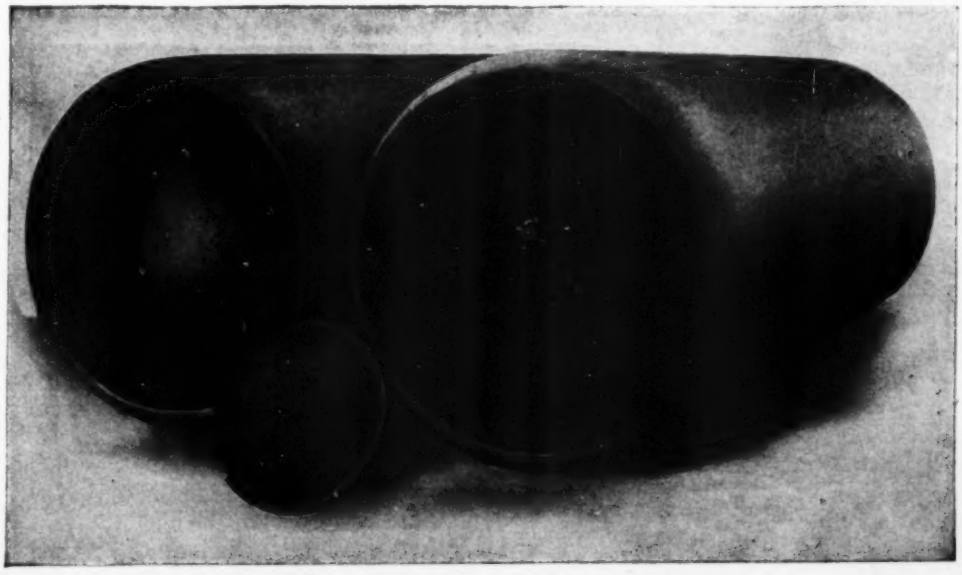
1. Inflammability.
2. Poisonous effects.
3. Irritating effects, with interference with sight or respiration.

Considering now the specific case of chlorine, we can eliminate "A" since it is non-explosive. The chance of a rupture due to "B" is very slight on account of the high critical temperature of chlorine. The following table gives this temperature for a number of common gases:

Chlorine	146
Ammonia	132
Acetylene	36.5
Nitrous Oxide	36.5
Carbon Dioxide	31
Oxygen	-118
Hydrogen	-240

By I. C. C. regulations all cylinders and ton drums are provided with fusible plugs which melt at 158 deg. Fahrenheit, at which temperature the pressure is about half the test pressure of ton drums at time of manufacture and a quarter of the test pressure of the smaller cylinders.

There has never been an instance of bursting of a container in transit, or in a user's plant.



There have been four or five cases of the rupture of containers in the manufacturer's plant due to the presence of foreign material in the container which reacted with the chlorine. To guard against a repetition of such accidents, all manufacturers now have in force a rigid system of inspection of empty containers. Even should a container with such foreign material be filled, any trouble resulting will necessarily develop within a few hours, so that any hazard existing from this cause concerns only the manufacturer—not the user or the carrier.

There have also been a few cases of fire where a large quantity of chlorine has been stored. In each case the upward draft due to the heat of conflagration has been strong enough to carry the gas upward and cause a sufficient dilution so that the fire fighters were caused no inconvenience in their work.

This brings us to leaks. Here the evil smell of chlorine is its own greatest safety factor. Its presence in the atmosphere can be detected in very minute quantities through the sense of smell. After the person in charge of the use of the chlorine in any plant has had his first considerable whiff, he is quite ready—from then on—to exercise reasonable care, take necessary precautions, and follow the instructions laid down by the manufacturer.

The next safety factor is the slow absorption of

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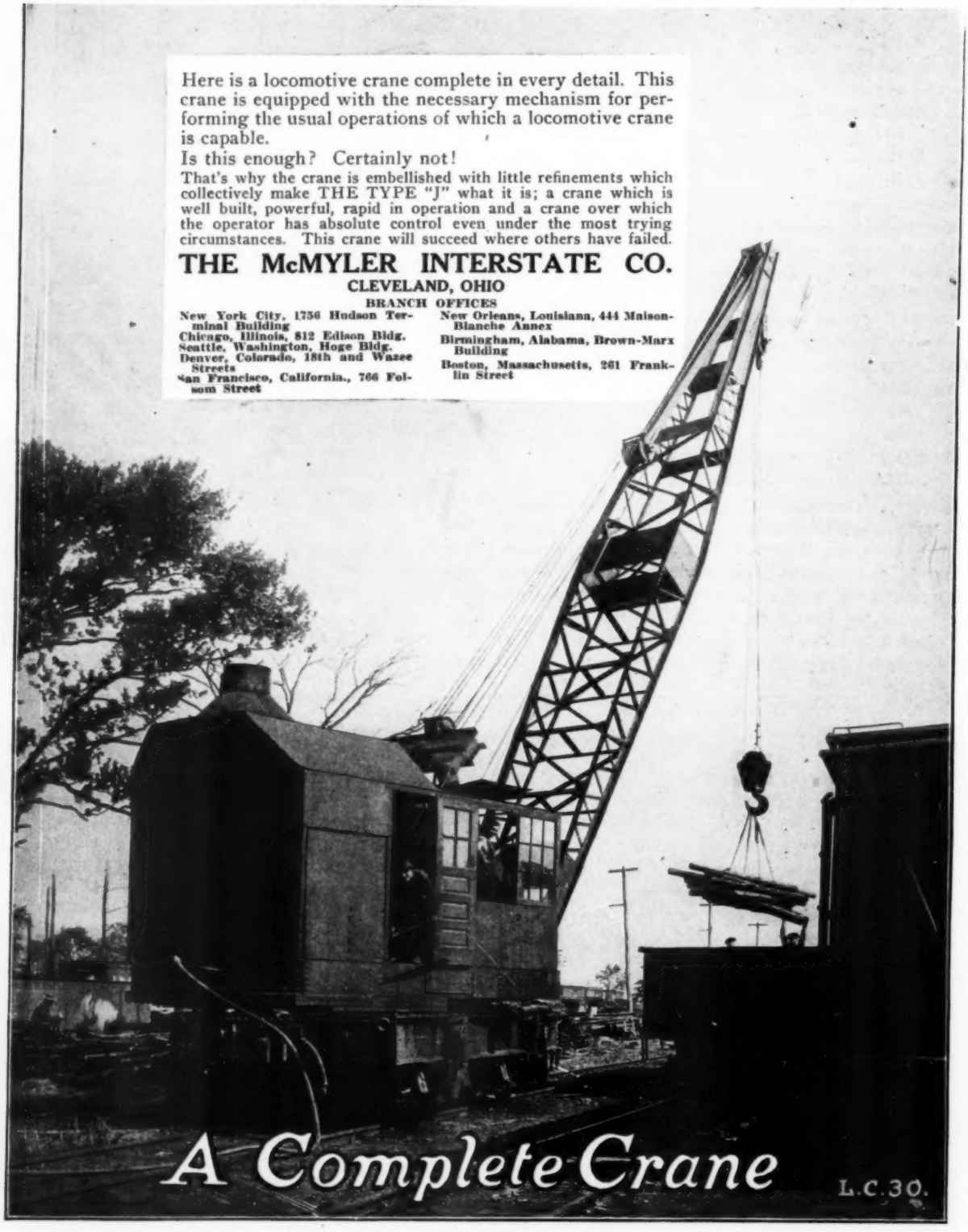
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the heat necessary to evaporate the liquid into a gas. The following table gives the rise of temperature of the liquid chlorine in a tank car during a period of 96 hours:

Time (Start)	Temp. Contents (—9 deg. C.)	Change during period —	Pressure (64 lbs.)	Change during period —
End 24 hrs.	—2 deg. C.	7 deg. C.	76 lbs.	12 lbs.
End 48 hrs.	+3.5 deg. C.	5.5 deg. C.	88 lbs.	12 lbs.
End 74 hrs.	+6 deg. C.	2.5 deg. C.	93 lbs.	5 lbs.
End 96 hrs.	+8.5 deg. C.	2.5 deg. C.	98 lbs.	5 lbs.

When the odor of chlorine is noticed the source should immediately be located. Never hunt a leak through the sense of smell. Always have a gas mask handy and be sure you have fresh canisters. The mask is not apt to be used, but it gives confidence to the one hunting the leak. Have a bottle of aqua ammonia and a piece of waste fastened to the end of a short stick. Dip the waste into the ammonia and start your search. The moment you come to chlorine in the air, a white fume of ammonium chloride will appear. As you reach a denser volume of chlorine, the white fumes are denser. Thus the leak is quickly located. If this leak is in the piping, etc., shut off the valves at the containers and repair. If in a valve on the container or the container itself, and it cannot be stopped, connect the gas valve from the container to your absorption system and begin to operate. The liquid cannot evaporate in the containers, without the application of heat, as fast as the gas is absorbed in your system, and thus the leak quickly stops.

As to the properties of chlorine, it is non-inflammable, and not poisonous, in the sense that carbon monoxide or phosgene for instance is poisonous. We can therefore eliminate Nos. 1 and 2, and confine ourselves to No. 3.

The immediate result of inhaling a large quantity of chlorine gas is the inflammation of the tissues lining the throat with resulting coughing and nausea. While it is highly irritating and extremely uncomfortable, it is never fatal—unless the subject remains for a considerable period in an atmosphere of highly concentrated gas.

Should a person be affected by chlorine gas we recommend the following treatment: Remove at once to the open air and away from all gas fumes. Place the patient flat on his back with head slightly elevated, and give a half teaspoonful of essence of peppermint, or a moderate dose of bromo seltzer or whiskey. This will relieve the tendency to cough and soothe the inflamed membranes, allowing the passage of air and promoting the action of the respiratory organs. The person affected should himself resist as much as possible the impulse to cough. A mustard plaster on the chest will give prompt relief. While there are never any serious after-effects, a physician should always be called.

As this discussion is before the Pulp and Paper Section, we can safely assume that we are preparing to store a considerable quantity of chlorine. First let us discuss storage in either cylinders or ton drums.

The storage space should be selected with an eye to easy unloading and transfer to the absorption room. Either of the smaller cylinders may be readily unloaded from a car and rolled over a floor by one man, but if possible, overhead trolleys should be installed for carrying them. They are suspended from the trolley by a chain block and grasped by a pair of tongs made especially for this purpose. Cylinders are usually handled and stored in an upright position. Ton drums are shipped in gondola cars, each drum resting in a cradle. In unloading them it is therefore necessary to lift the drum clear of the car by means of a chain block and crane or similar device, after which it may be conveyed to the absorption room by either rolling over a level floor or track, or carried by an overhead trolley or industrial car. Ton drums are always used and stored in a horizontal position. The storage had best be under a roof but without sides on a concrete floor above any possible flood line. It would hardly seem necessary to enclose the storage space to protect against unauthorized handling of the cylinders.

The large user will wish to receive this material in the 30,000-lb. container, which is permanently fastened to a standard freight car and thus becomes a tank car, and so freight is paid only on the contents. This means a very large saving in the delivered cost of the bleaching material. Thus far the major portion of the material moved in tank cars has been delivered from the car directly into the absorption system, the cars in many cases being emptied in from four to six days. Here again is a marked reduction in cost due to elimination of handling charges.

Mills using liquid chlorine, who can take tank car deliveries, should face the storage problem. There are two methods open. First, the filling of the 2,000-lb. container or the so-called ton drum, or fixed tanks large enough to take one tank car only. Both methods are now being installed for the purpose of getting comparative data.

In our opinion, the local conditions affect this problem so that a detailed discussion of the best method of storage is useless—at least at the present state of the art. The problem is, however, one which can readily be worked out for any particular case.

Don't work with a careless fellow. Tell him of his faults. If he insists on being careless tell the foreman. This is not "preaching," it is protecting the man and his fellows from possible injury, says the National Safety Council.

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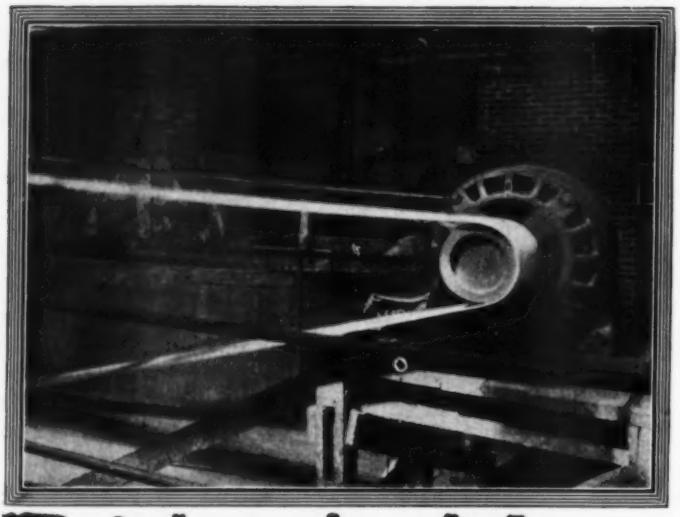

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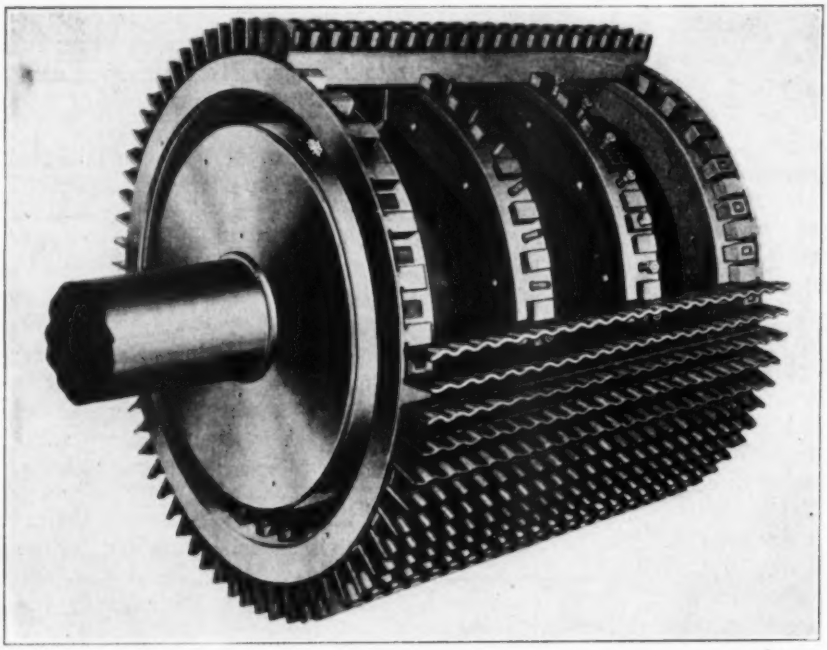

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Beater Roll Fly Bars and Bed Plates

By W. F. EBBING

IT IS said that it is in the beater where paper is made; as a result close attention is being given to the beater, and that which goes to make up the beater, the fly bars and bed plates, as well as the kind of pulp, rags, waste paper, etc., that the beater brings to the proper condition for the successful making of paper.

The methods of manufacturing fly bars and bed plates vary according to materials used, and begin with the manufacture of steel. Samples taken at random are analyzed and tested for ingredient content, hardness, surface defects such as seams, decarbonization, and internal defects. The idea that any steel will do for a fly bar in the beater roll or a bed plate is not good practice, and should not be generally followed, and is not by first class manufacturers of these articles, so important to good paper making.

Good steel fly bars require not only the knowledge of steel and its proper heat treating, but are manufactured under exacting conditions for size as to length, width, thickness, slotting and straightness. Every bar in a roll should be of the same size, and straight on both front and back edges.

The control of heats, whether for heat treating, forging, hardening or tempering, is essential. Very fine instruments to regulate and control the various heats are used and records kept. Throwing an armful of pulp and an armful of something else into a beater and say that you will make this or that grade of paper, and expect to get the same thing today that you got yesterday, is a practice long abandoned in correct paper making, as is the same illusion abandoned in correct manufacture of fly bars and bed plates. Too much stress cannot be laid upon the importance of using the best fly bars and bed plates in the beater.

Ninety-five to 99 per cent of the fly bars and bed plates are made of steel. Years ago these were of high carbon tool steel welded to a soft steel back, or what is called laid bars, the idea being to maintain a square edge on the roll bars and the steel filling of a bed plate. Then the idea was conceived that on the cheaper and rough grades of paper and paper board the beater, fly bars and bed plates were not so essential, so that in that class of paper the cheapest kind of steel bars were used. The error of this was short lived and there was developed the O. K. Soft Center Fly Bar.

The O. K. Soft Center Fly Bar is hardened and tempered. Both flat sides are hardened and tempered bone hard about 2½ inches back from the cutting edge, the back part of the bar being left in the natural or soft state permits the bar to bend back considerable before breaking should some foreign substance, such as iron, get into the beater. The center of the thickness also being left soft—that is, between the hard flat sides—wears away first, leaving duplex hard edges which will not burr over or wear rounding, but continue to stay sharp during the life of the bar, and the life of the bar is lengthened because of the special heat treatment, also because a tempered knife will wear longer than an untempered one, or any steel that is not heat treated.

Square sharp edge bars require less power than bars whose edges become burred as will be done on steel not heat treated.

For the past few years, another type of steel has been brought out which is known as Special Alloy Steel or Vanadium Alloy Steel bars. The difficulty here, however, is the non-uniform ingredient contents. Considerable of this trouble is overcome by heat treating, so that it might be well to insist on heat treated steel, whether the bars are to be made of open hearth steel or an alloy steel.

Bed Plates

When you get from the manufacturer a bed plate of whatever style or design it may be, each bar of steel in that plate shows a square edge, whether the wood is as high as the steel or below the edges of the steel, and in most cases there is used a soft steel not heat treated. In a little while these untreated steel bars burr, the edge of the steel being as an illustration ⅜ to ½ inch or more thick, when originally it was but $\frac{3}{16}$ or ¼ inch thick, literally covering the wood filling so that as the plate becomes smoother and smoother it becomes nearer to impossible to beat off the stuff. To get the plate to its original efficiency you have to chip the steel or the burred part and bring it back so the wood will show as it should.

Steel of whatever nature or structure should be heat treated and the heat treatment to vary according to ingredient contents and the work it is to do. The manufacturer that does this is sincere in his efforts to help you produce better paper, increase your product and decrease your cost.

Drains

Drains for steam pipes should be provided at all points where it is possible for water to accumulate. Some may be for use only when putting the line into service, but are necessary at such times. Drains from points where there is even slight difference in pressure should not be joined together or to the same trap, as the difference will prevent the proper operation of the one of lower pressure. If a still lower pressure or constant discharge is maintained beyond the point of junction, as in the Holly loop, the foregoing does not apply.

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Teaching Paper to the Coming Generations

By FRANK HILTON MADISON

WHEN the school children of Chicago—and very likely many other cities—grow up, they are going to be better users of paper than this present generation. They are taught about papermaking in the schools—not merely by reading about it but from specimens showing the raw materials and the finished products. Their parents too learn about paper when they visit the community centers in the school buildings. Inasmuch as the plan used in Chicago is about to be adopted in many other cities, the next generation will be better posted on the economic values of paper.

Several portable exhibits of "Making Paper from Wood" are among the hundreds and hundreds of interesting cases routed through the grammar and high schools, the Y. M. C. A. schools and the ex-service men's vocational schools of Chicago by the N. W. Harris Public School Extension of the Field Museum of Natural History. In the course of a year they are studied by from 300,000 to 500,000 persons. These persons will study them because there are no long Latin names to scare them away. Instead, brief information about the sources of paper and something about the processes is given.

This appeal in the paper, as well as other exhibits, is probably due to the fact that Dr. S. C. Simms, curator of the Extension, was in his earlier days a successful newspaper man. He writes straightforward labels and the cases are not made deep, but like the merchant's windows, the "goods" are up near the glass where they can be studied. "What would a girl or boy want to know about paper?" is Doctor Simms' guide in making up an exhibit.

Phases of the paper industry are probably included in several museum exhibits, but in the typical museum not much about paper reaches the public in an impressive manner. People do not remember much besides the unique animals when they "do the museum" in a day. When children visit museums they generally consider it a holiday even if their teacher escorts them and gives scarcely-listened-to lectures in front of the cases. Although school children are always admitted free, less than a tenth of the Chicago pupils visit the Field Museum in a year, and then their trips are not always of proper fruitfulness.

The late N. W. Harris, prominent Chicago banker, was much impressed by the educational possibilities of thorough study of natural history and economic specimens. After consulting the best teachers and sociologists available, he established a $250,000 foundation for the Field Museum to be used in traveling exhibits of natural history and economic specimens.

In working out the plan to make study attractive instead of a drudgery, the paper specimens are placed in mahogany cases, 24 inches long, 21 inches high and seven inches deep. The specimens are mounted on black-painted thin wooden tablets, 3x5 inches or larger and, where necessary, in glass-lidded containers mounted inside the case. Each specimen is plainly and briefly labeled.

At each side of the case (and a structural part of the case) are large framed descriptive labels. These labels project like ears but slide into the case when the cases are being transported from school to school. This one from the botanical exhibit "Making Paper from Wood," is a guide to the specimens shown:

"Wood is the raw material of most importance to the paper maker today. Straw, grass, rags, waste paper, old rope, hemp, etc., are also used. The following briefly describes the contents of the accompanying case, which show the results of various steps employed in the making of paper from wood.

"Piece of balsam fir with bark unremoved. Logs are received from the lumber camps in various lengths up to fourteen feet. They are then cut, in the sawmill, into two foot lengths and conveyed from there into the barkers where the bark is removed.

"Piece of balsam fir with the bark removed and ready for the chipping machine.

"Chips of the wood as they come from the chipping machine. The chips are conveyed to the digesters where they are cooked under pressure in a solution of soda lye.

"The cooked pulp as it comes from the digesters and before being washed or screened.

"The same pulp screened and washed free from chemicals.

"The finished pulp ready for shipping. It is usually sold in a moist state and in bales.

"The same pulp when dried. The next process is that of converting the raw pulp into paper. This is done by means of beating, and, during this process, size, alum and color are added.

"Raw paper ready to be made into the finished paper on the paper machine.

"Shows the paper direct from the paper machine before being dried by means of steam and polished by calendering.

"Samples of finished paper of various colors and weights."

Other cases show paper of various kinds; in the flax exhibit there will be linen rags used for paper-making; corn shows the outer portion of the stalk used for paper making, and in learning about Pyralin the students find that cotton fiber is first made into paper.

These cases of specimens and labels are intended only to innoculate the children with interest in the subject. The desire for more information about paper and its uses is naturally whetted. The teachers frequently have the classes write compositions about the things which they have studied. It is certain that a great many of the youngsters air their newfound knowledge at home. Inasmuch as a case goes to every room in the school and is shown at the community center gatherings the economic value of forests and paper is definitely impressed upon the people of a neighborhood. When the allotted three weeks have expired the cases are picked up by the specially designed motor truck and carried to the next school, other subjects being left in their place.

There are many benefits to the paper industry in this plan of visual education. The industry in general will be better off if large numbers of children are glad to remain, interested, in school to grow up into more contented and better citizens. The next generation will be better acquainted with paper and that means better buyers and better sellers. Those of the children who have a natural liking for papers and gravitate to the industry will make a desirable group of interested and efficient employes—the sort that infect others with the idea that they are working in a good field.

And the best thing about the plan of educating the coming generations about paper is that it is not likely to stop in Chicago. Other cities are getting busy through their museums and schools—Brooklyn, Philadelphia, Pittsburgh, St. Louis, Milwaukee, Cleveland and Los Angeles are some that have shown active interest. One branch of the United States government has been making extensive investigations, and it is likely this new note in education will ultimately reach every community.

Warns Against Over-Optimism

Warning against undue optimism is expressed in the monthly review of business conditions of the American Paper and Pulp Association, when Dr. Hugh P. Baker, executive secretary, called attention to the need of caution in accepting statements that business has permanently turned for the better.

"The outstanding note of the recent business conference of the paper industry at Chicago," says this review, "was an essential but conservative optimism as to the future of the industry. One prominent manufacturer phrased it slightly differently, when he said that this meeting of the paper manufacturers and merchants demonstrated the need of "constructive pessimism" for the next few months.

"The outstanding feature of the conference was the essential optimism as to future business conditions evidenced in the formal addresses and informal conferences alike. The addresses gave not only optimistic sentiment, but statistical evidence to warrant such a feeling. Throughout the conference, however, ran an undertone of caution, a feeling that undue optimism was not to be encouraged, that feeling of constructive pessimism referred to above.

"Every external evidence was that the worst phase of the deflation period had been passed, but that minor readjustment may be possible before industry in general is fully stabilized."

A formal meeting of creditors of Riordan Company, Limited, unanimously ratified the proposal for an extension of credit of one year to November 19, 1922. It is probable some new financing will soon be attempted through creditors and shareholders.

The plan under consideration is the raising of $1,500,000, asking unsecured creditors and preferred stockholders to contribute at the rate of 10 per cent of their holdings.

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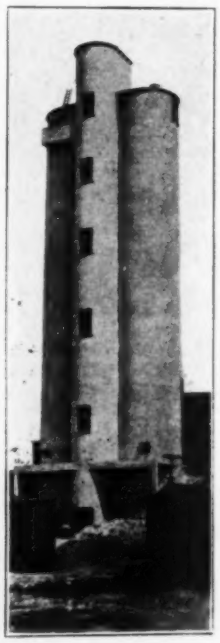

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Technical Association Papers

The two following papers were written by members of the Committee on Sulphate Pulp which is composed of the following: Carl Moe, Chairman; J. A. DeCew; Gustaf F. Enderlein; Ralph W. Fannon; Richard H. Laftman and George S. Holmes. This committee is endeavoring to collect information on the various phases of the sulphate pulp industry which have a bearing on economical and sanitary improvement, and would appreciate the co-operation, for this purpose, of all members of the Technical Association of the Pulp and Paper Industry, who are interested in sulphate pulp manufacture. This co-operation may be given either by criticism of the Committee's activities or by suggestions for new lines of investigation. The Paper Industry gladly offers its columns for publication of any articles or comments bearing on this subject.—Editor.

Utilization of Lime Sludge

By Carl Moe

Minnesota and Ontario Paper Company

ONE of the problems of chemical pulp mills, using the alkaline process of pulping, is disposal of the lime sludge. There are four ways conceivable by which this by-product may be disposed of, viz:

1. Washing it out in streams or rivers.
2. Piling it on the ground and leaving it there.
3. Reclaiming it by incineration and using it over again.
4. Utilizing it for other purposes.

The first method is the most convenient one and probably the one most universally employed. But the contamination of streams and rivers with caustic lime sludge is likely to kill the fish and also make the water unfit for drinking, although this contention has not been proven. In certain states, it is prohibitive to pollute rivers in this manner.

The second method requires considerable ground, according to the size of the plant. If there be a low tract of land available for the purpose close to the mill, the sludge may be conveyed through a system of pipes or open spouts or ditches. Where the location is not favorable for this, it has to be hauled away in specially constructed wagons or cars.

There is no sulphate mill in this country, as far as the writer knows, using reclaimed lime for causticizing, although several soda mills are reported to do so with advantage.

Of other uses for lime sludge, there is one which deserves more consideration than it has been receiving in the past, although it has been recommended decades ago. This is to utilize it as a fertilizer. It seems that very few have acted on this recommendation, notwithstanding the fact that as a dressing for acid soil it stands unexcelled. The writer had the opportunity to observe a striking demonstration of this last summer. Robert K. McDonald, a business man of Stevens Point, Wis., has a model dairy farm right outside that city. The soil around there has a decidedly acid character, and it is customary to apply commercial limestone. Mr. McDonald decided to try an application of lime sludge from a sulphate pulp mill near by—Stevens Point Pulp and Paper Company—for comparison. He had reasoned out that the impalpable character of the sludge ought to make it many times more effective than the coarse commercial limestone. In the fall of 1920 he applied first a top dressing of manure and then with a manure spreader he covered about 27 acres with lime sludge in a ratio of approximately 4 to 5 tons of moist sludge to the acre. This field was prepared in the usual manner and planted with corn in the spring. On another field he applied sludge to about 5 acres, which were subsequently planted with clover.

The effect of the application of lime sludge on the corn field has been noted in a case where rows were planted which had not been limed while close by others were planted to which commercial limestone had been applied, and in this case it was seen that commercial limestone had no perceptible influence on the growth, whereas, in another case where the same comparison was made, lime sludge being used instead of commercial limestone, the advanced development of the plants was quite remarkable. When the writer visited Mr. McDonald's farm the latter part of August, it was just after harvesting time, and he had then the opportunity to note just as marked a difference between the ears of corn from the field with sludge application and those from the field without sludge application. The latter were green and undeveloped, while the former were full and ripe. It had been an exceptionally dry spring and summer and it had not rained for months, but the soil where sludge had been applied was quite moist a couple of inches underneath the surface, and on no other place had mature ears been developed.

The appearance of the clover fields showed a similar difference. At the places where sludge had been applied the growth was more or less luxuriant, while at places with no sludge application it was scanty.

Removal of Odors from Digester Blow in Sulphate Mills

By Gustaf F. Enderlein

Nekoosa-Edwards Paper Company, Port Edwards, Wis.

THE problem of removing the disagreeable odors from the sulphate mill has been taken up from time to time, but a practical solution seems yet to be wanting, and undoubtedly much more work and time will be necessary before a way is found that will work out satisfactorily and economically. The most difficult part of the problem is the removal of the odors from the furnace gases on account of their dilution and large volume. The removal of the odors from the digester blow is more inside of the possible with apparatus that are easy and relatively cheap to construct.

When a sulphate digester is blown, a certain amount of disagreeable odors from sulphide compounds will be relieved with the steam and thrown out in the atmosphere. As these vapors usually are relieved on a relatively low level and have no chance to spread out in the atmosphere like the gases from a smokestack the odors will make themselves known at once and rather strongly, to the discomfort of the people living in the neighborhood. If this relief could be kept inside of a pipe or any other inclosure and not let out in the atmosphere, the odor would, of course, be eliminated. By blowing a digester a large amount of steam is relieved, as the digester usually is blown at a relatively high pressure, and to be able to keep this relief from going out in the atmosphere, every part of it has to be condensed. In some mills the relief from the blow is used to heat up wash water and in this way part of it is condensed, but the odors going off into the atmosphere apparently are as strong as before, as only a minute part of the odors is dissolved in the condensate. Those condensers or heaters used are tube condensers or outside condensers. Cooling water and condensate are kept separate. This is of advantage when using the water for feedwater or for a similar purpose, but for reasons mentioned below, it is more of an obstacle than help to eliminate odors from the vapor.

To condense completely the relief from the digester blow with an outside condenser, a large amount of tubes would have to be used to give enough surface, and a large amount of cooling water would have to be supplied, as the whole amount of vapor from the digester has to be condensed in the short time of ten to fifteen minutes. A prolonged blow-time would cause the pulp to hang up in the digester, which also would happen if the pressure in the digester were low at the beginning of blow.

In the method described below, the idea of the barometric condenser was made use of, instead of the outside condenser, in order to take care of all the relief and produce a complete condensation of all vapor, and still not have to use an excess of cooling water. The barometric condenser has, as known, a spray in top of a standpipe, vapor coming in at the top. As soon as the vapors come in contact with the spray they are condensed and a vacuum is created. The vapors and cooling water, going in same direction, are thus in direct contact with each other. To further the dividing of the cooling water in the standpipe, not only one spray, as in the ordinary barometric condenser, was used, but a series of sprays, making, so to say, a series of condensers in one. In this case the cooling water is thoroughly mixed with the vapor which has to go through a very heavy mist. This is one of the main factors to eliminate the odors. As known, the ordinary water contains quite a considerable amount of air, which also will be mixed with the gases and, here is the point: by oxidizing the sulphide in largest degree eliminates the odors. This will not be the case in an outside condenser, as here the water from the condensate, which is the only water that may eliminate some of the odors by dissolving, is the only water that comes in contact with the relief, and it does not contain any air and therefore no oxygen for oxidation of the sulphides.

Going out from above ideas, a condenser was constructed

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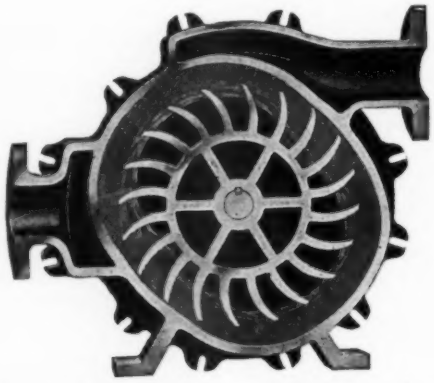

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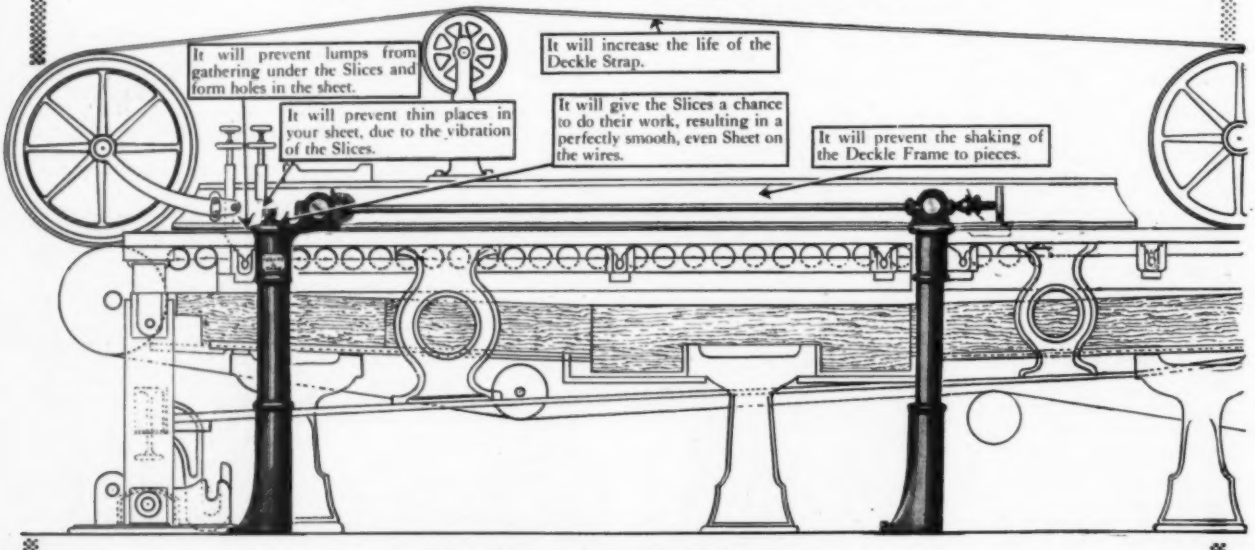
"is indispensable to the making of Good paper"


It will prevent lumps from gathering under the Slices and form holes in the sheet.
It will increase the life of the Deckle Strap.
It will prevent thin places in your sheet, due to the vibration of the Slices.
It will give the Slices a chance to do their work, resulting in a perfectly smooth, even Sheet on the wires.
It will prevent the shaking of the Deckle Frame to pieces.

It will make better edge, save breaks and take less power.

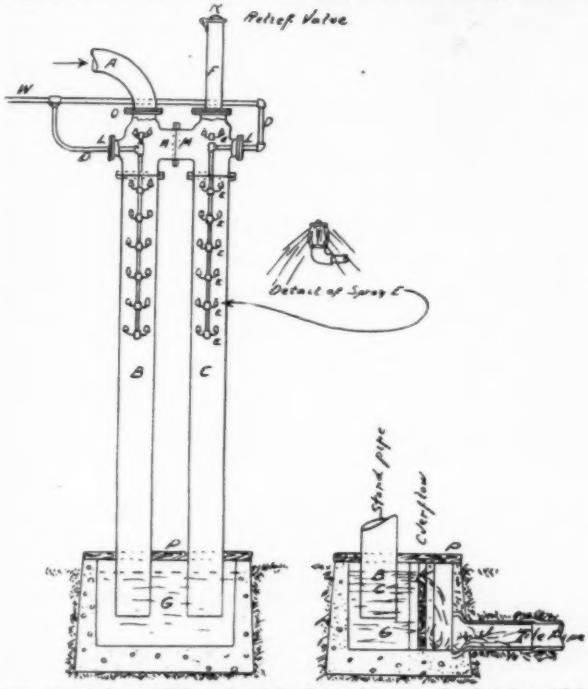
Manufactured and Distributed by
HUBAND & NASH
Menasha, Wis.

Most of the best mills in this country are equipped with this device.

and put in active service and found to work satisfactorily. It condensed practically all vapor relieved from the digester blow.

A reference to the accompanying sketch will make the construction and working of this condenser clear.

The relief gases from the saveall in the diffuser room are led through pipe "A" to the condenser, connected to the top at "O" to one of the two standpipes. The two standpipes used in this case are about 24 inches in diameter and were decided as more convenient than one higher and wider. They are connected above by two crosses. The top opening on one is, as mentioned before, connected to the pipe "A" and the top opening of the other is connected to a 5 inch relief pipe "F" with a safety valve "R." Side-openings "M" are connected together, allowing the steam from relief line "A" to be divided up into the



two standpipes "B" and "C." Opposite are the intakes "L" used for pipe lines for the cooling water. To the bottom openings of the crosses the standpipes "B" and "C" are connected. "W" is a 4 inch water line dividing into two 3 inch lines "D," one for each standpipe, entering the cross at "L" and supplying the water for the sprays "E." These sprays are arranged in pairs, the first pair being in the cross of the standpipe and the next one below the flange. The following pairs are about 24 inches apart. The opening for the cooling water in the sprays is about ½ inch and tapered, through which it shoots up against a baffle plate which in turn is deflecting it downwards, as shown in detail sketch. The pressure in the water line is about 40 lb. and the spray delivers the water with a good force. The water is also deflected from the sides of the standpipe and so making a very heavy mist along the entire length of the spraypipe and also below. The lower ends of the standpipes are submerged into a well "G," made of concrete, covered with a wooden top "P." The well "G" has a loose partition wall "K," by which the waterlevel in the well may be raised so as to seal the outlet of the standpipes. The water flowing over the dam is taken care of by the tile-pipe "J" and may be directed to any place desired.

Just before the blow starts, the feed valve for the cooling water on the 4 inch line is opened and the sprays put into action. At the time the blow starts, there is formed a back pressure, as the relief line from saveall in the diffuser room is directly connected to the condenser, which is water sealed at the bottom. At this moment, safety-valve "R" on relief pipe "F" starts to act and opens up, but as soon as the full steam is coming over it is condensed by the water spray and a vacuum is formed. As soon as the pressure disappears, the valve "R" closes up and no gas can escape there to the atmosphere. This valve may be of the simplest construction. A hinged top of wood with a piece of belting nailed on the underside answers the purpose. The water coming out at the well is very warm and could be used for washing or other purposes, as no smell can be detected at the well. This seems to prove the theory of the oxidation of the sulphides and that the disappearing of the odors is more an oxidation and less dissolving of the odors in the water.

Report of the Soda Pulp Committee

By G. K. Spence, Chairman

ARRANGEMENTS were such that time was to have been very much limited in Washington, and the Soda Pulp Committee had not made very elaborate plans for work at this meeting. It was understood that the work laid out by the Bureau of Standards would exhaust about all of the time allotted for papers and discussions in the general assembly.

It was, however, arranged by the Soda Pulp Committee to have a conference some time during the evening at Washington, which was to have been in the nature of a symposium on "Recent Developments in Soda Pulp Washing."

Mr. Morrison of the Oliver Continuous Filter Company, was to present a paper on results obtained by use of continuous filters on washing black liquor from soda pulp, giving figures showing results obtained in mills where this system of washing has already been installed. This paper was to have been followed by a discussion on this very important question, and if time had permitted, other subjects of general interest to the soda pulp manufacturer would have been discussed. Since it has been deemed advisable to cancel the fall meeting, Mr. Morrison has arranged to have his paper published in the trade papers in the near future.

The Soda Pulp Committee is now planning to have a doubly interesting meeting in the spring in order to make up for what we have missed by cancelling the fall meeting. The same idea will be carried out that was inaugurated in New York last April. Each member of the committee will be requested to write a paper on a subject of interest to the soda pulp manufacturer, and all papers will be discussed at a soda pulp conference to be held some time during the meeting. The program will be so arranged that all members will have advance notice of the time of this conference and such a time will be selected that will not interfere with any member attending any of the other conferences in which he is interested.

My associates on the Soda Pulp Committee for the ensuing year, are Messrs. Martin L. Griffin of the Mount Hope Finishing Company, Grellet N. Collins of the Dill & Collins Company, Wallace H. Howell of the New York & Pennsylvania Company, George M. Trostel of the Champion Fibre Company, and William S. McClelland of the P. H. Glatfelter Company. These men have all had long and varied experience with soda pulp manufacture and their papers should elicit interesting discussions.

Third Meeting of the Connecticut Valley Cost Association

The third meeting of the 1921-1922 season of the Connecticut Valley Local Division of the Cost Association of the Paper Industry was held at Strathmore Inn, Woronoco, Mass., on Monday evening, November 14, 1921.

The meeting, which was preceded by a truly excellent dinner at 6:30 p. m., was opened by President Ralph H. Merrill, who made the announcement that the next meeting would be held at the Holyoke Y. M. C. A. and is to be under the direction of a committee composed of Mr. Webster of the Carew Manufacturing Company and Mr. Brown of the Hampshire Paper Company.

The meeting was then turned over to Mr. R. M. Mudgett, chairman of the committee in charge. The committee had chosen for the subject of the evening, "Managing the Cost Department" and had selected Mr. J. A. Reilly of the American Writing Paper Company to present his views on this subject as the manager of a large cost department; Mr. R. M. Mudgett of the Strathmore Paper Company to describe the methods used in conducting a medium size cost department; and Mr. Webster of the Carew Manufacturing Company to show the plan necessary in operating a small sized cost department.

The speakers were requested to follow an outline provided by the committee in the following manner:

* * *

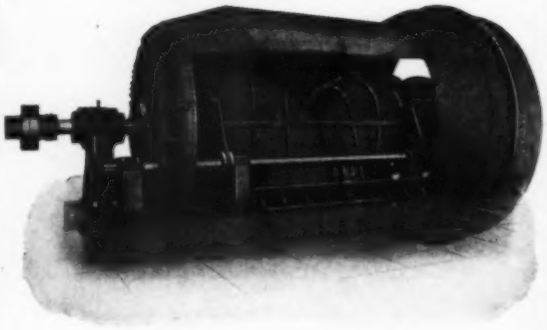
THE JOB—

What does it include?
Do you have it scheduled?
If so, discuss schedules, how built up, how operated, etc.
What plan to get the work done and know that it is being accomplished?

THE PEOPLE—

Do you use male or female clerks? If any preference, discuss it.
Do you have any definite policy as to promotion or increase of pay based on length of time in service or increased efficiency? Discuss the point.

Smith Hydraulic Turbines



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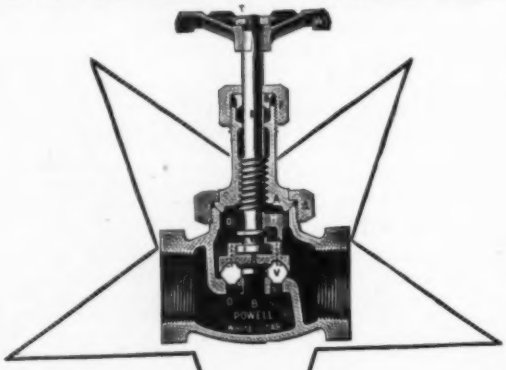

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SLIP-ON Disc Carrier protects the unused face of disc

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40 to 50% Saving on Labor and Steam

DIAMOND
VALV-IN-HEAD
SOOT BLOWERS

Important mechanical features of the Diamond Valv-in-Head soot blower are: Monel metal valve, seat and disc; full floating construction permitting movement of the unit in any direction; control of speed through reduction gearing; ease of operation due to ball thrust bearings, etc., etc.

Cost of labor and steam are two important items in soot blower operation. Note how the Diamond Valv-in-Head cuts these costs in half:

LABOR (a) The total time required for blowing is cut squarely in two.

(b) There are no lost steps and no lost time between opening of valve and operation of unit.

(c) Only one man is required, no matter how large the boiler. (With other types of blower heads two men are customarily employed on large boilers.)

Under these conditions the cost of labor for cleaning boilers is comparatively small.

STEAM (a) Steam jets are revolving throughout the entire blowing period.

(b) Speed of rotation is controlled by gear reduction. No waste of steam occurs as the result of too slow or too rapid operation.

(c) Globe valves, essential to other heads, require many valuable moments to open and close, during which steam is wasted. The automatic operation of the Valv-in-Head eliminates losses.

The saving in steam with the Valv-in-Head is pronounced, because every bit of steam does effective work in cleaning the boiler.

These are only two of eleven important advantages of Diamond Valv-in-Head soot blowers. Others include savings in pipe, valves and fittings, maintenance, gain in cleaning efficiency, etc., etc.

Every boiler needs a mechanical soot blower and you will save money by buying the best. Ask for your copy of Bulletin 297 describing the new blower.

DIAMOND POWER SPECIALTY COMPANY
Detroit, Michigan

Diamond
SOOT BLOWERS - SAVE 4 to 8% FUEL

What method of training new people? Do you have written standards of practice? If so, exhibit a few.
Do you believe in such a system?
Do you provide opportunities for clerks to come in contact with executives? Do you think it is a good thing? Discuss it.

Mr. Mudgett was the first speaker and explained his company's method of conducting their cost department, following the outline referred to. His system of planning and following up the daily progress of the work of each clerk; his company's policy of employing only male clerks, and a unique demerit system, were the outstanding features of his address.

Mr. Reilly, the second speaker, outlined his ideas of the proper way to conduct a cost department, which was extended to include the compilation and control of inventories, manufacturing ledgers, and other analogous work. Several instructive exhibits were presented to the members by Mr. Reilly showing explicitly how many of the features were dealt with. His system of employing every possible mechanical device, operated by expert female clerks, in the execution of cost, inventory and other data for a large manufacturing establishment made up of numerous distinct production units, was well presented and proved of interest. Outstanding among the exhibits were the speaker's method used in costing the performance of each class of clerical work within his own department; charts, showing the layout of his departmentalized organization; and the detailed schedule of all the clerical work under his jurisdiction.

Mr. Webster stated that it was self evident no extensive planning was necessary in a small office such as he conducted. His clerical work was properly apportioned and he was in personal touch with all the work each day.

At the close of Mr. Webster's talk, the body immediately opened a general discussion which brought out a much more universal response than the discussions following our regular meetings generally do.

This was followed by a short talk by Mr. Bush, who spoke briefly on the outstanding points of the previous speakers, and also gave some information on the doings at the Chicago Convention.

The meeting, which was one of the most successful so far conducted in regard to the number present and interest shown, was adjourned at 10:15 p. m.

Kalamazoo Cost Division Meeting

The Kalamazoo Local Division of the Cost Association of the Paper Industry held a meeting on November 28, 1921, at the Park-American Hotel, at Kalamazoo. Much of the discussion centered around the subject of payroll systems. A series of talks on this subject were made by the following gentlemen: John Ross, of Bryant Paper Co.; George Jupp, of Kalamazoo Paper Co.; Clair Crossley, of King Paper Co.; Paul Broesamle, of Monarch Paper Co.; George Ferguson, of Watervliet Paper Co., and C. E. Spangler, of Eddy Paper Co.

"Treatment of Costs During Good and Bad Times and the Effect on Inventory" was the subject covered in an address by Harry C. Bradford, of King Paper Co. Mr. Bradford spoke as follows:

Mr. Bradford's Address

There is considerable discussion at the present time about how to handle Cost during this period of business depression. The question is, should we base our cost on the last year overheads, or should they be based on normal production.

In the first place, let us ask what is normal production. Probably every one will have a different idea as to what his normal is, and therefore the question might naturally be asked. If you cannot agree to what constitutes normal production, how can you agree as to what manufacturing cost is during periods of normal production. Finding the answer is not so difficult if we keep in mind that the determining factor in costs, aside from material, is time. Probably it would be better to say "Normal Operation" instead of "Normal Production."

To determine the normal hours of operation of a producing unit, it is necessary to deduct from the total operating hours an allowance sufficient to cover the time required for washup, changing wires and felts and repairs. This should be based over as long a period as possible. The normal thus established should be changed as experience shows the allowance to be incorrect.

Cost of material and productive labor is a part of manufacturing cost. These two items will vary directly with the volume of production, except in some cases the labor will not decrease as rapidly as the volume of production, for the reason that certain employees are retained because of their value to the organization.

Three Classes of Expense

There are three classes of expense, manufacturing or producing, selling and administration expense. These are the ones that I will call your attention to. Most of these expenses just mentioned are going on all the time—it makes no difference if the mill is running overtime or normal.

I think it is safe to say that until very recently the great majority of manufacturers considered every manufacturing expenditure as an element of manufacturing cost. It has been a custom to wait until the close of the month or the close of the accounting period, and then to sum up all these expenditures for material and productive labor, and call them direct cost, also to sum up all other expenditures for so-called overhead purposes and divide the total by the number of pounds or tons made. Then next came the custom of using last month's expense and labor to obtain a rate which was used for the current month. This last method does not come so far from being right during normal times, and when the expenses are normal; but let us consider what happens to the sales department when the business is such that production is only fifty per cent of normal. Suppose the costs are based on actual cost, this will mean an excessively high cost. What is the sales department to do when confronted with such a condition? Business is poor; the results of competition is a lowering of prices. The more the manufacturer wants the business, the lower he will make his prices; but the sales department is confronted with a condition, illustrated by the following table:

Determination of No. 1 Machine Room

	Actual 50% Normal	Normal	150% Normal
Labor	3,000	5,000	7,500
Felts	100	200	300
Wires	200	400	600
Fixed charges	1,000	1,000	1,000
Auxiliary Dept.			
Power	3,000	4,000	5,500
Bldg. Ex.	1,000	1,000	1,000
Gen. App. Ex.	1,200	1,200	1,200
Repair Dept.	400	800	1,000
	9,900	13,600	18,100
Hours	500	1,000	1,500
	19.80	13.60	12.07

If the Machine Department is running on an order where they are making 1,000 pounds per hour, in the first or actual the cost would be 1.98 per cent. The normal would be 1.36 per cwt. and 150% of normal would be 1.21. You will note that the actual is about 45% more than normal.

Suppose that the calendering, cutting, trimming and finishing, under normal times, amounts to 1½ cents per pound, the increase would amount to 67½ cents per cwt. Then suppose the preparation of the half stuff, in normal times, makes the finished paper cost 50 cents additional; adding together the 45% of 50 cents, or 22½ cents, 67½ cents for extra finishing, and the extra cost of 62 cents of machine would make 1.52 per cwt. Then a sheet under normal conditions would cost 10 cents per pound, and during the time when the mill was running 50% normal it would cost $11.52 per cwt.

Effect on Inventory

Next let us consider the effect on the Inventory, and what affects the Inventory affects the Profit and Loss statements.

Suppose at the end of the year, after you have been running normal, you have on hand 500,000 pounds of paper that cost you 10 cents, or $50,000. At the end of June, the following year, you still have on hand 500,000 pounds of paper, part of which was the amount you had on hand at the end of December, and inventory it at $11.50, account that you had been running at 50% of normal, and that grade cost you $11.50 per cwt.; this would make the total amount $57,500, or an increase of $7,500.

Under the old method, in addition to having an incorrect inventory at the end of that period, all the monthly statements have been incorrect, since you are accumulating a supposed profit.

If a company had two similar mills in two different cities, and one plant was operating at normal capacity, and the other was idle, would you charge all the overhead to the mill that was running? If you moved all the machinery into one building, would you change your principle? If your costs are based on actual, when the production is only 50% normal, it will make the costs so high that they are of less value for basing selling prices, pricing inventory, and checking up the efficiency of the manufacturing.

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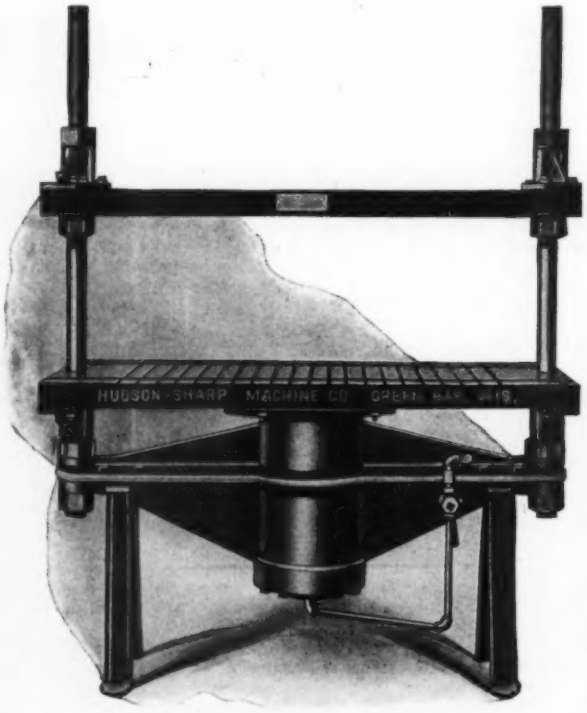

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HUDSON-SHARP MACHINE CO.

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261 Broadway, New York, N. Y.

I do not want you to think that what I mean by a normal rate is a fixed rate, or a rate of $13.60 per hour for No. 1 Machine department. The normal rate should be checked with the actual and normal rates, all figured new at least twice a year, and when the rate of wages changes, or the price of supplies, make a large increase or decrease.

Another advantage in establishing costs on the basis of normal production is that we are able to measure the cost of idleness. The expense which cannot be charged to costs because it is due to a lack of operation, is certainly the cost of not doing business, or in other words the cost of idleness. This should be watched constantly by those responsible for the outcome of the business. It might be that the cost of idleness in a given period is $20,000, but by securing a certain volume of business at cost some of the overhead could be absorbed and the loss correspondingly reduced. This would not appear in the profit and loss statement as a profit, but it would appear as a reduction of a loss.

I might say in conclusion that figuring at actual cost during bad times greatly lessens the value for pricing inventory, basing selling prices and checking the efficiency of operation.

The advantages are the correct basis for selling prices and inventory, and a good sound basis for checking the efficiency of operation and a check on the idle time.

W. G. McNaughton New Secretary of T. A. P. P. I.

An old-time member of the Technical Association, in the person of W. G. McNaughton, has been selected by the committee in charge as secretary of the Technical Association of the Paper and Pulp Industry, and reached New York this week to take over the duties of the office, succeeding Thomas J. Keenan, who resigned to resume the editorship of Paper.

In making this selection, the association has gone into the ranks of its own membership to secure a man who is not only of high scientific attainments, but whose work with technical branches of the paper industry has been noteworthy.

Mr. McNaughton graduated from McGill University, Montreal, in 1904, and was in chemical work with the Canadian Rubber Company until 1908, when he went with the Nekoosa-Edwards Company to organize in its laboratory work. He remained there until 1917, becoming superintendent of manufacture, leaving Nekoosa to reorganize the operation of the Inland Paper Company at Spokane, which was a complete plant making sulphite, groundwood and various grades of paper.

On August 1, 1920, he went with the Kimberly-Clark Company which was building a 120-ton sulphite mill to be followed by ground wood and paper mills, at Kapuskasing, Ont.

Mr. McNaughton is beginning his new duties at once, with his office in the rooms of the American Paper and Pulp Association, 18 East 41st street, New York.

Merger of Three Michigan Mills

Merger of the King Paper Company and the Monarch Paper Company of Kalamazoo, and the Bardeen Paper Company, of Otsego, was effected early last month, with Arthur L. Pratt, president of the King Paper Company, as chief executive of the allied mills.

The merger, representing an approximate property valuation of $6,000,000, will be known as the Allied Paper Mills. The three plants have a capacity of 350,000 pounds of finished paper and 125,000 pounds of coated paper every 24 hours.

Pratt Is President

Mr. Pratt, president of the new concern, will be assisted by A. G. Gilman, general manager of the Monarch Paper Company, and George H. Gerpheide, secretary and manager of the Bardeen Paper Company, as vice-presidents, and George B. Davis, secretary of the King Paper Co., as secretary.

S. B. Monroe, president of the Bardeen Paper Company, president of the Northern Michigan Pulp Company, and treasurer of the Hawthorne, MacSim-Bar and Lincoln Paper Companies will be treasurer of the Allied Paper Mills.

The board of directors, including the combined directorates of the three mills, is as follows:

E. G. Read, Richland; George Cobb, Schoolcraft; George H. Gerpheide, George E. Bardeen, Florence G. Bardeen, Otsego; J. W. Thompson, E. J. Dayton, Detroit; E. S. Rankin, S. B. Monroe, A. B. Connable, John Pyl, C. A. Peak, George R. Davis, George Ritchie, H. L. Vanderhorst, A. E. Kettle, C. A. Dewing, A. L. Pratt, J. H. Dewing, A. G. Gilman, George Hanselman, W. E. Kidder, Kalamazoo.

Counsel for the Pusey & Jones Company, of Wilmington, Del., has asked the United States Circuit Court of Appeals to revoke the appointment of receivers in equity, alleging that the company is not insolvent.

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Is revolutionizing the paper making industry.

If your machines are not equipped with Press Rolls of Barre Granite you should let us tell you about them.

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If you have ever used *any* of the Bolton products, Fly Bars, Bed Plates, Jordan Fillings, or Knives of any kind, you found them *HIGH GRADE* in quality and finish and economical in cost.

You can order any of the Bolton Quality line and know that you will find same equally *High Grade,* equally *well finished,* and equally *economical.*

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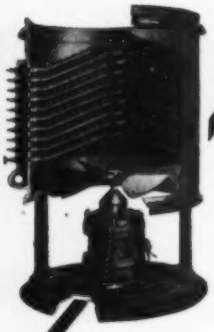
High Grade Fly Bars, Bed Plates, Jordan Fillings and Knives



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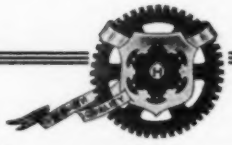
is accomplished by removing the cold air from the floor line and replacing it by the warmer air that naturally tends to go toward the ceiling.

The *Bayley* B. T. U.

distributes heat evenly by means of an electrically-driven fan, installed under a series of tempering coils. The fan forces air through the coils and keeps up a constant circulation of tempered air throughout the room. It is made of iron and steel throughout, requires no distribution ducts; no holes through fire walls or partitions, can be installed anywhere by simply setting on the floor and connecting steam and return piping and wiring to motor. Easily moved from one location to another.

Send for B. T. U. Bulletin today

Dept. B, BAYLEY MFG. CO.
732 Greenbush St., Milwaukee, Wis.



Engineering Service

Put your power transmission problems up to the Hill Clutch Company's engineers.

Send us the roughest kind of a pencil sketch showing what you wish to accomplish. Our engineers will solve your problems and we will then submit sketches and estimates. This will place you under no obligation; it is simply Hill Clutch Company's service and it is absolutely free to all of our customers and any others interested in power transmission machinery. It is a pleasure for us to serve you as engineers as well as builders of machinery.

CLEVELAND TYPE
Hill Collar Oiling Bearing

We manufacture a complete line of efficient power transmission machinery, including the well-known Hill Friction Clutch (Smith Type) and Hill Collar Oiling Bearing.

Catalog and bulletins upon request

The Hill Clutch Co.

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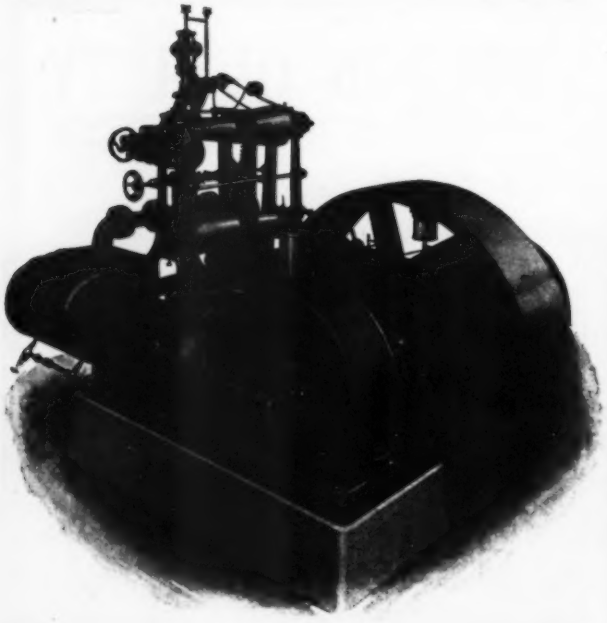
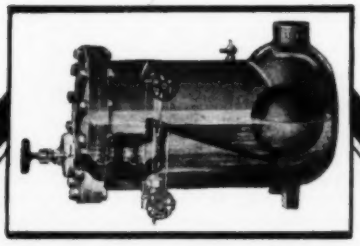


Variable Speed Engine

The engine illustrated above is especially designed to drive paper machines, giving continuous and reliable service. A patented safety device protects your employees and plant.

THE BROWNELL CO., Dayton, Ohio

SEND FOR BULLETIN E-4



It's a *Davis* Steam Trap —the best for paper mills

DAVIS STEAM TRAPS are removing condensation from steam lines without the loss of steam in a great many paper mills.

As with all Davis Valve Specialties, long life and dependable operation are assured. In the illustration above, note the large float, sensitive leverage, renewable valves and seats of durable Tobin bronze, all working parts attached to cover and removable with it.

Every paper mill operating man should have the 72-page Davis Catalog that describes the complete line of Davis Valve Specialties for power plants. Write the G. M. Davis Regulator Co., 414 Milwaukee Avenue, Chicago.

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1875

Fox River Paper Company Floats Bond Issue

The Fox River Paper Company is issuing $750,000 of an authorized issue of $1,250,000 of 7 per cent bonds, secured by a first mortgage on its mills at Appleton, Wis., and the pledge of its equity in the Tolulah mill. The appraised value of the property, after depreciation, is over $3,250,000, and total net tangible assets will exceed $3,800,000, or over three times the total authorized bond issue. Net earnings for five years available for interest, depreciation, and taxes have averaged over eight and one-half times interest charges on this $750,000 bond issue, and after depreciation and taxes 4.42 times such charges. A minimum sinking fund of 25 per cent of net earnings is provided to retire the bonds at 105 for the first year, the price diminishing ½ per cent yearly to 102½ per cent, which rate prevails thereafter until maturity, Oct. 1, 1931.

Hinde-Dauche Mill to Open January 1

The new plant of the Hinde-Dauche Paper Company is practically completed and machinery is being installed in the structure with the intention of beginning operations in the plant about January 1, according to a recent announcement made by the officials of the company.

The factory will be devoted almost solely to the manufacture of paper box board.

The plan of the factory is a composite one drafted by T. L. Peterson, superintendent of the present plant of the company there, and engineers of the Hinde-Dauche company. The many years of experience of Mr. Peterson in paper making is shown in the splendid ideas embodied in the plans drafted for the plant.

A. W. Maynes

A. W. Maynes, president of the Hercules Paper Corporation, of New York, died suddenly on Saturday, December 3, 1921. Even though he had been ill for several weeks, his illness was not thought to be serious and his passing away was a severe shock to his friends, employees and business associates.

Although Mr. Mayne had been associated with the Hercules Paper Corporation less than a year, he was well known in the paper industry, having been connected for years respectively with the Fox Paper Company and the Whitaker Paper Company.

Mr. Maynes formerly lived in Akron, Ohio. Interment took place in that city, and the burial services were held in Glendale Chapel on Tuesday, December 6th.

Changes in Export Paper Company

The Belgo-Canadian Pulp and Paper Company and the St. Maurice Paper Company have withdrawn from the Canadian Export Paper Trade Company, to take effect at the end of the present year.

As originally organized in 1917, there were five large news print manufacturing companies in the Canadian Export Paper Trade Company. The withdrawal of the Belgo-Canadian and the St. Maurice Companies will leave only three news print companies, namely, the Laurentide Company, Price Brothers and Brompton. The capacity of the Belgo-Canadian Paper Company is 205 tons per day, while the capacities of the St. Maurice Company is 110 tons per day.

Increase in Stock at Eddy Paper Company

At a recent meeting of the stockholders of the Eddy Paper Company, Three Rivers, Mich., they authorized the directors to sell 700,000 shares of common, "no par" stock at $1.50 per share. This stock will have equal voting value with and equal dividend rights to the old common stock of the company.

Funds from the sale of this stock will be used for various purposes, one of which will be the expenditure of approximately $200,000 in improvements in the plant.

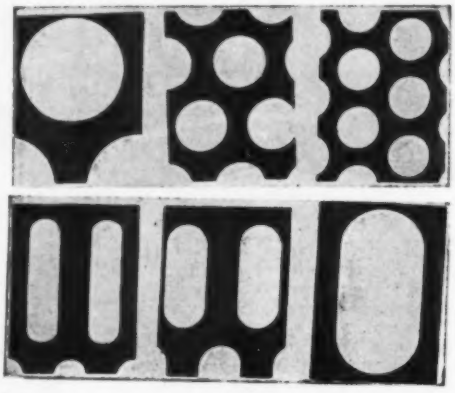
A. L. Pratt was elected chairman of the board of directors.

The Oregon Pulp & Paper company has nearly completed the foundation for a new bleaching plant to be operated in connection with the paper mill at Salem, Oregon. The building will be 40 by 100 feet. The building will be entirely of corrugated iron. With its completion and the installation of machinery the paper mill will be in position not only to bleach all its own paper but to bleach sulphite sold to other mills.

Edward Beck, formerly publicity manager, has been appointed secretary of the Canadian Pulp and Paper Association, succeeding A. L. Dawe who has become associated with the Canadian Export Paper Company, Ltd. Mr. Beck is also manager of the association.

RUGGED
CONSTRUCTION
Insures Long Life
UNION
RENEWABLE
UND. LAB. INC.
100 MEC
AMP STD VOLTS
CHICAGO FUSE MFG. CO.
You have often noted the massive rear wheels and axles of a big truck. Rugged construction in every line. Built to stand the gaff of heavy service.
Wherever endurance is requisite you will find strength, ruggedness. And this principle applies to the "Union" Fuses as well as to the motor truck construction.
We feel perfectly safe in our claim that the "Union" Renewable Fuse will stand a greater number of blowouts than any other fuse—because we know that it is more strongly built. The casing is extra tough and extra thick. The ferrules are rigidly screwed and riveted to the casing—outside, as a reinforcement against the action of a "blow." The cap and washer are exceptionally heavy and accurately fitted to give utmost rigidity.
By its looks alone you can tell that a "Union" Renewable Fuse has enormous powers of endurance.
It is this ability to take punishment—to stand blowout after blowout—that makes the "Union" Renewable the most economical fuse for you to use on circuits subject to frequent blowouts.
"Union" Fuses, both Renewable and Non-Renewable, are for sale by all leading jobbers and dealers.
They are approved in the very highest degree by the National Board of Fire Underwriters.
Free descriptive booklet on request.
The "Union" saves more than ANY other renewable fuse
Chicago Fuse Mfg. Co.
Manufacturers of Switch and Outlet Boxes, Cut-Outs, Fuse Plugs, Automobile Fuses, Renewable and Non-Renewable Enclosed Fuses.
Chicago New York
"UNION"
RENEWABLE
& NON-RENEWABLE FUSES

Perforated Metal Screens



Of Copper, Brass, Steel, Bronze, or Any Other Metal

Perforations of All Sizes and Shapes for Use in Pulp and Paper Mills in

Centrifugal Screens, Drainer-Bottoms, Filter Plates, Pulp Washers, Suction Box Covers, Etc.

Accuracy in all details and excellence of quality at lowest consistent prices

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NEW YORK OFFICE, 114 LIBERTY STREET

Perforated Metal Screens

in all metals for pulp and paper mills

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"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

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Boston, Mass. ..... 93 Broad St.
Cleveland, Ohio ..... 919 Ulmer Bldg.
Chattanooga, Tenn. ..... 702 James Bldg.
Philadelphia, Pa. ..... 318 Widener Bldg.

"Steel for Strength—Wood for Durability"

Succeeds Dr. Charles H. Herty as Editor of the Journal of Industrial and Engineering Chemstry

Mr. Harrison E. Howe has been elected to succeed Dr. Charles H. Herty as editor of the Journal of Industrial and Engineering Chemistry and director of the A. C. S. News Service, which are conducted by the American Chemical Society. Dr. Charles L. Parsons, of Washington, secretary of the society, stated that Mr. Howe had accepted both positions.

Mr. Howe, until his election to his present position, was at the head of the Division of Research Extension of the National Research Council. The new editor writes extensively for magazines on applied chemistry and has done notable work in the popularization of science. He is the author of a recently published popular work, "The New Stone Age."

Dr. Herty resigned the editorship to which Mr. Howe succeeds to accept the presidency of the newly formed Synthetic Organic Chemical Manufacturers' Association of the United States which has opened offices on the 34th floor of the Metropolitan Tower at No. 1 Madison avenue. Dr. Herty's career in chemical journalism has been varied by many public activities. By special appointment of President Wilson he went to Paris in 1919 as the representative of the United States in the matter of the distribution of German dyestuffs under the economic clauses of the peace treaty. Dr. Herty was also chairman of the committee of the American Chemical Society advisory to the Chemical Warfare Service, member of the Dye Advisory Committee of the Department of State, and chairman of the advisory committee of the National Exposition of Chemical Industries. In his new position he will devote himself to the development of American synthetic organic chemical industry.

G. K. Gibson to Represent Poland Paper Co.

George K. Gibson has been appointed western representative of the Poland Paper Company, manufacturers of bond, ledger, writing, offset and extra strong book papers, with offices at No. 1616 Conway building, Chicago. Mr. Gibson has been president of the Paper Salesmen's Association, has held various offices in other paper associations and is well known through the paper trade.

A. R. Melker, for the past eleven years identified with the paper trade in New York, has joined the sales force of the Invincible Paper & Pulp Corp., of 135 Broadway, New York City. Mr. Melker formerly was with Storm & Bull, Inc., and more recently has been with the W. A. Armstrong Paper Company.

Vernon R. Schroff, formerly in charge of the book paper department of the Whiting-Patterson Company's Philadelphia branch office, has entered business for himself under the name of the Read Paper Company, with offices in the Drexel Building, Philadelphia. He will specialize in book papers.

R. F. Hammond, dealer in and importer of wood pulp at 342 Madison Avenue, New York, has returned to business activities following a prolonged illness occasioned by a serious operation undertaken last August.

J. D. Jenssen, of the G. D. Jenssen Company, paper and pulp mill engineers, of 200 Fifth Avenue, New York, recently returned from an extended trip to Europe.

New Catalogue on Pulverized Fuels

A bulletin entitled "Pulverized Fuels" has just been published by the Hardinge Company. This bulletin is known as their No. 9 catalogue.

The adoption of the Hardinge mill for pulverized fuels is comparatively recent, according to their own statement, as follows:

"The Hardinge conical mill, although only recently applied to this field, has been fully demonstrated as a most satisfactory unit for pulverizing solid fuels. The results obtained are a continuation of the remarkable record of the Hardinge mill in the mining and industrial grinding fields, as evidenced by the fact that over 70,000,000 tons of friable materials are being ground per year in Hardinge mills alone."

This bulletin is divided into three main sections, viz., the application of pulverized fuel to various burning problems, the principle of operation of the Hardinge mill, and a discussion of the application of the Hardinge system for pulverizing fuels.

Under the heading of "Pulverized Fuel," three principal causes are mentioned why the advance of this class of fuel

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Cut down *excessive* wrapping paper investment. Why carry two wrapping paper lines for one wrapping paper *purpose?*

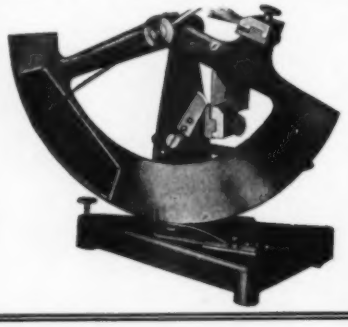
MOSINEE

presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

Mosinee Kraft

"The Wrapper that Delivers the Goods"

Don't guess at tearing strength—*measure* it



The tearing strength of paper is too important a quality to justify the use of uncertain and inaccurate methods. With the

ELMENDORF PAPER TESTER

you can determine tearing strength quickly and accurately. It gives definite figures that can form the basis of standard specifications for buying and selling paper.

Write for Bulletin 17 on Paper Testing Instruments

THWING INSTRUMENT COMPANY

3353 Lancaster Ave. **Philadelphia, Pa.**

112

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PRICE & PIERCE, LTD.

17 East 42nd Street, NEW YORK CITY

ARE NOW THE

SOLE SELLING AGENTS
for Bathurst Pulp

Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

BATHURST, NEW BRUNSWICK, CANADA

Largest producers in the world of highest grade Brimstone —guaranteed 99½% pure—free of Arsenic and Selenium.

The
UNION SULPHUR COMPANY

In so far as possible we will be glad to offer advice or suggestions to prospective buyers who are using or may be contemplating the use of brimstone.

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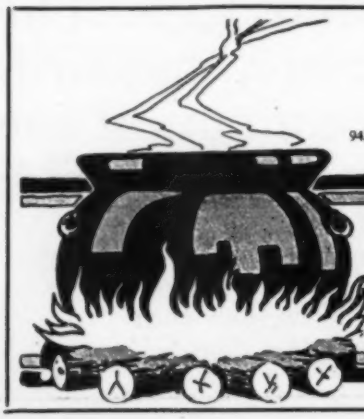

SWENSON EVAPORATOR CO.

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Main Office
945 Monadnock Block, Chicago

519 Widener Bldg., Philadelphia
30 Church St., New York

Works
Angola, Indiana Harvey, Illinois
Bedford, Indiana Joliet, Illinois

Cable Address, "Evaporator Chicago," Western Union Code

SWENSON EVAPORATORS

has been so rapid in the last few years. These reasons are:

A—The increased efficiency of combustion.

B—The utilization of fuels which would otherwise be wasted or be very inefficiently burned.

C—Flexibility of operation and ease in handling, making it possible to control the burning within a wide range on short notice.

In the general discussion of pulverized fuel where the Hardinge system is used, emphasis is layed upon the point of "sparkling" during the burning process. They emphasize the point that when coarse oversize of from 65 to 150 mesh, depending upon the character of fuel, is eliminated, "sparking" ceases, and when this oversize is eliminated by a satisfactory means it is not necessary to grind to a degree of fineness which was at one time thought necessary.

Under the subject, "The Hardinge Mill," the general principle of grinding is discussed, with special reference to stage reduction, elimination of the fine particles as soon as produced, and the proportioning of energy to the work required. The different types of Hardinge mills and the details of their construction are also discussed in this section, and special reference is made to the advantages of the conical mill when used for pulverized fuels of widely different character.

Under "Pulverized Fuel Installation," a complete pulverized fuel plant is outlined, which includes the feeding of the coal from track hopper to the crushers, dryer, mill, separator, and distribution system. There are also taken up different arrangements of the mill and separator which would be used according to the special arc requirements. In addition, there is given a table showing the general dimensions of the different sizes of Hardinge mills, so that it is possible to make a rough estimate of the floor space required for each unit.

Engineering Advertisers' Association Now Publish Monthly Bulletin

The Engineering Advertisers' Association of Chicago is now publishing a monthly bulletin in the interest of its members. The bulletin gives a digest of the speeches made at the various meetings and also includes other information and facts regarding the movement of goods from industry to industry, personal notes, etc.

The current copy includes an address by Kenneth Grossbeck, vice-president of the Harry Porter Company, of New York City, on "The Baconian Theory of Advertising," which is well worth reading.

The first issue contains no advertising, but in later editions a small amount of advertising will be accepted, as the board of directors have agreed to devote not over two pages, divided into ten spaces each, to this publicity. This necessarily will limit the number of advertisers to twenty, and this space is sold merely to meet the cost of publishing.

We are advised that at the present time there are a limited number of extra copies of the "Bulletin" which will be sent upon request to the advertising managers of concerns selling technical or engineering products.

Blake & Decker, Inc., paper dealers and mill agents of New York City who for the last three years have been located at 501 Fifth avenue, have moved to 50 East Eleventh street where in addition to office quarters they occupy 6,000 square feet of warehouse space. In the new location the company will carry a full stock of fine papers. The concern represents the Worthy Paper Company, W. C. Hamilton & Sons and the Wheelwright Paper Company in the New York territory.

The Golden-Anderson Valve Specialty Company, Pittsburgh, Pa., announce that they have appointed Lawrence G. Whitsit, member Am. W. W. Assn., and F. W. Du Bois, associate member Am. Soc. of C. E., as their Michigan representatives, who will operate under the name of the Waterworks Equipment Company, with offices at 8242 Woodward avenue, Detroit, Mich.

The Combustion Engineering Corporation, 43 Broad street, New York City, manufacturers of mechanical stokers and furnace equipment, announce the recent opening of two branch offices, one at 216 Latta Arcade, Charlotte, N. C., in charge of Mr. T. E. Nott, and the other at Seattle, Wash., where they are represented by Fryer-Barker Company, 1133 Henry building.

The Chapin & Gould Paper Company, Inc., of Springfield, Mass., manufacturers of high grade bonds, ledgers and wedding papers, has opened a New York sales office at 121 Nassau street. Philip S. Chadwick, formerly with the Rudolph Paper Company, of New York, and prior to that with the American Writing Paper Company, is in charge of the branch.

Pulp *and* Paper
Making Machinery
demands
Journal Bearings
of
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The Best Material
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"The Quality"
BEARING

has proven to be the
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satisfying these
strenuous demands

WRITE TODAY TO
The Hart Roller
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Orange, New Jersey

KNOW WHAT YOUR COAL BILL SHOULD BE

There's no longer any such commodity as "Cheap Coal," and indications are that there probably never will be again. At present prices, or for that matter—at *any price*—it is neither good engineering practice nor good management to check your coal by mine weights or railroad weights.

RELIANCE WEIGHING MACHINES

insure an *accurate* and *positive* check on every ounce of coal consumed. They provide a means, without additional labor cost, of checking the total received against the total purchased. They show to operator and executive the exact amount of coal consumed by each boiler. They bring efficiency and economy into coal consumption.

Weighs—records—indicates—without manual effort—the entire operation automatic.

Each machine is a unit in itself, so perfect in design and flexible in application that it will meet any existing plant conditions.

The services of our engineers are at your command in helping you plan prospective installations.

Write us for details.

RELIANCE WEIGHING MACHINE CO.

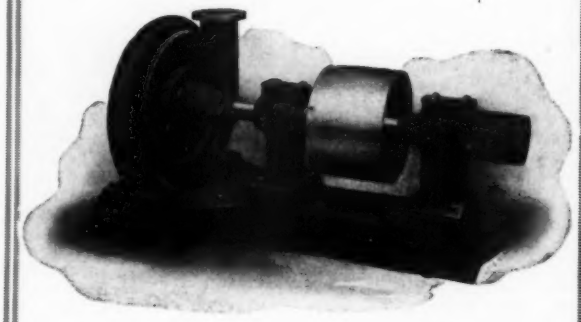
General Offices and Factory

LUDINGTON, MICHIGAN

Representatives in principal cities United States and Canada

CENTRIFUGAL PUMPS

for



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E. M. Cross Mach. Co.

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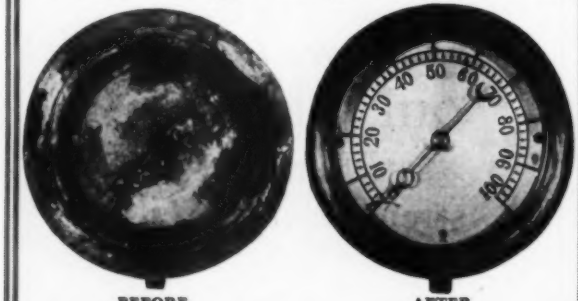
One Gauge Repaired Free



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Specializing Pressure Gauge Repairing All Styles, All Makes, Including Pyrometer and Recording Gauges, Marine Clocks and Rev. Counters

REGARDLESS OF WHO MANUFACTURED YOUR GAUGES, Regardless of their CONDITION, we GUARANTEE to put them in First Class Working Condition

We request you to send one gauge to be repaired—no charge—as a sample of the quality and delivery of our work.

Immediate delivery of work that is uniformly excellent, at a satisfactory cost.

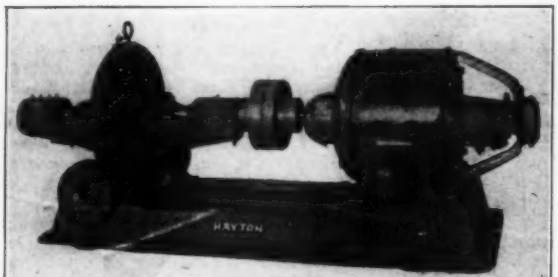
The Manning Gauge Company, Inc.

77 Traverse Street, BOSTON, MASSACHUSETTS

Hayton Centrifugal Pumps

SAVE POWER and MONEY

BY USING



HAYTON CENTRIFUGAL PUMPS

"With us it is an engineering problem"

Designed especially to meet the requirements of pulp and paper mills. We do not build a pump after OUR ideas and then try to sell it to you. We make a study of YOUR peculiar problems, and then build a pump to suit your needs. Hayton Pumps are built for hard, continuous operation, and will stand up under the most severe usage. We guarantee the highest efficiency, and maximum economy in power consumption.

We also build a full line of Sandusky Triplex pumps.

Let us have your specifications for quotations

Hayton Pump & Blower Co.

Manufacturers

APPLETON, WISCONSIN

Nashville Paper Company to Add New Structures to Powder Plant Unit

Quite a force of men is already at work at the Old Hickory powder plant site in developing the unit taken over by Chicago capitalists in the summer for the operation of a pulp and paper plant, the corporation to be known as the Nashville Pulp & Paper Company.

According to H. H. Moss, general manager of the Nashville Industrial Corporation, which undertook the development of the powder plant site into an industrial center, the pulp and paper company purchased one of the purification units, containing seven buildings, and proposes to add three more structures of two or three stories, all to be used in the operation of manufacturing pulp and paper. The chief engineer for the new pulp plant is expected to arrive soon and the work pushed as rapidly as possible during the winter so as to be ready for actual operations by May or June, it is reported.

The company is capitalized at $1,200,000, and the plant, when completed, will be one of the largest in this section. Special interest attaches further to the establishment of a pulp and paper mill at Old Hickory in that it will be the only one of its kind in Middle Tennessee.

The present force of workmen numbers about forty.

Southern Pacific Cuts Freight Rate

Reductions of freight rates on hundreds of articles, amounting in some cases to 50 per cent, have been announced by the Southern Pacific Company.

The reductions, it was declared, average about 20 per cent and will be effective in the case of changes to meet competition of water traffic via the Panama canal as soon as they are approved by the Interstate Commerce Commission; in the case of rates from and to points east of the Mississippi River and Chicago, effective as soon as eastern roads concur; and in the case of rates to and from points west of Chicago and the Mississippi River, as soon as the tariffs can be published.

The reductions were announced as representing the policy of the carriers to reduce "freight rates as well as wages where the reductions can be made in the public interest."

Among articles on which west-bound reductions will be effective are dry goods, iron and steel, tin plate, glucose products, machinery, refrigerators, pitch, turpentine, glass, vehicle, furniture, coal, canned goods, linoleum and soap. Rates on east-bound products which are reduced include those on borax, vegetables, hops, lumber, syrup, pickled fish, paper, flour and nuts.

Extension of Time Granted for Amended Income Tax Returns

Following a protest by the American Paper and Pulp Association and others interested, the commissioner of internal revenue has issued an important order allowing an extension of time for the filing of amended income tax returns.

The order is as follows:

"In view of the fact that many taxpayers are unable to complete their returns by November 24, 1921, the last date under which amended returns may be filed, as provided by Treasury Decision 3220, an extension of time up to and including January 15, 1922, is hereby granted within which to file such amended returns and make payment of the additional tax due.

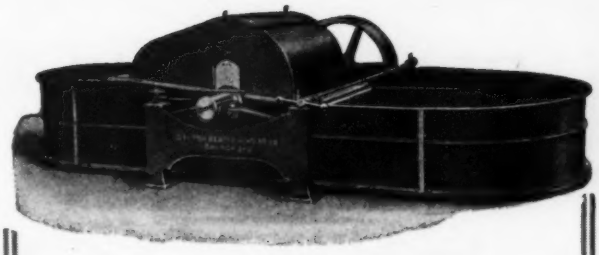
"D. H. BLAIR,
"Commissioner of Internal Revenue."

It is rumored that the erection of a paper mill near Fort George, B. C., to cost approximately $6,000,000, will be undertaken immediately, provided negotiations with the provincial government for leases on timber limits are successful.

President Dodge of International Paper Company is reported to have said that the company will shortly reduce the price for print paper to $70 a ton for the first quarter of 1922. The present price is $80 a ton.

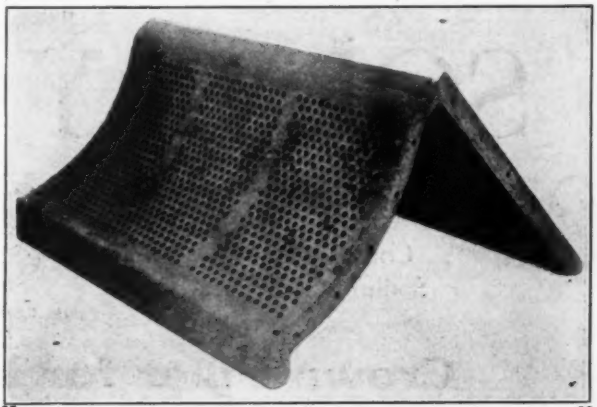
United Paper Board stockholders reëlected the directors and the latter reëlected the officers. The company reports a considerable improvement in business in the last few weeks, and is reopening mills.

Mills of the Hartje Paper Company at Steubenville, Ohio, are running full time under the direction of a receiver. The paper industry in that particular district is flourishing at present.



"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

DIAMOND ALKALI COMPANY

MANUFACTURERS OF

Soda Ash 58%

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Caustic Soda 76%

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Representing Wisconsin on Armistice Day at Washington

Picked from a long list of Wisconsin heroes of the World War, Sergeant John Hantschel, now a member of the Valley Iron Works Company clerical force, was chosen by the National Commander of the American Legion to represent the State of Wisconsin at the public funeral held in Washington, November 11, in honor of the unknown soldier dead.

John Hantschel enlisted in 1911 with the Appleton company of the Wisconsin National Guards. He served two enlistments and was with the Appleton organization on the Mexican border. At the opening of the World War he reenlisted and embarked for France on October 17, 1917, with Company A, 150th Machine Gun Battalion (Rainbow Division). His rank was that of sergeant.

He fought through the terrible battles in the Lorraine, Champagne and Chateau Thierry Sectors. It was in the latter, while leading a squad across the Orcq River in an endeavor to locate the enemy's position, that he was wounded. His right leg was shot away.

Since his release from the army he has been employed as one of the clerical force of the Valley Iron Works Company. The honor recently conferred upon him is well deserved. As further proof of the regard which his former comrades hold for him, over 500 of them escorted him to the train which was to carry him to Washington, and gave him an enthusiastic send off.

George E. Dudley

George E. Dudley, one of Michigan's pioneer papermakers, died recently at Dayton, Ohio, aged 76 years.

Mr. Dudley came to Watervliet, Michigan, in 1892, with W. E. Syms and built the Syms & Dudley writing paper mill. They operated the mill until 1899 under the name of the Syms & Dudley Paper Company, Mr. Syms and Mr. Dudley being the principal owners. In 1899 they sold their mill to the American Writing Paper Company.

Mr. Dudley is the last of the little group of men who went to Watervliet thirty years ago from Holyoke, Massachusetts and built the paper mill, the first writing paper mill in Michigan. His partner, Mr. Syms, Frank E. White, F. F. Smith and James Snover, are all dead. Before going to Watervliet Syms & Dudley were successful paper manufacturers in Holyoke. The Syms & Dudley mill at Holyoke was organized in 1880 with a capital stock of $100,000 and was successful from the start. They sold this mill at an advantageous price about 1891 and decided to go west for a new location, being attracted to Watervliet by the water power rights.

New England

Boston, Mass., Dec. 1, 1921.

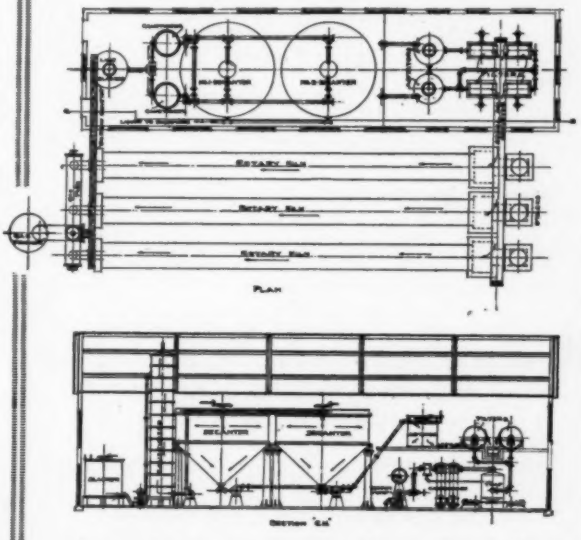
While in many respects improvement has been marked throughout New England paper manufacturing territory, nevertheless there is an underlying note of caution in all transactions both between merchants and their customers and mills and the supply dealers. In the case of the merchant and the printer or other paper consumer it is quite universally felt in New England that values of printing paper have not been thoroughly liquidated. This idea has been fostered among some of the printers' associations and as a result demand for paper by the consumer is spotty. Naturally this reacts on the mill.

However, in the field of coarse papers, especially tissues and kraft, improvement is very readily seen and reflected by the greater production of all the big producers of coarse papers throughout New England. Among kraft paper manufacturers there are the cases of Brown & Co.'s Berlin mills, at Berlin, N. H., the mills of the Claremont Paper Company, at Claremont, N. H., and Bellows Falls, Vt., and the Nashua River Paper Company, with its Pepperell and Groton Mills in Massachusetts, each one of them can be offered as a concrete example of the very excellent seasonal demand for kraft paper which has put all of them into the "sold up for weeks ahead" class. The seven-cent price which exists for best kraft papers is far from being the peak of the present upward trend. Some consumers believe it is the maximum, a belief wherein they are likely to be disillusioned. The writer has been given concrete evidence of a confidential nature during the past few days, demonstrating that an advance in kraft wrapping was considered necessary in some quarters owing to the press of demand. Moreover, the same source of information alleges that some mills are contemplating a return to the policy of selling goods based on price at the time of delivery, which is getting close to conditions which prevailed during the war period of 1917 to 1919. The advance contemplated would be as of December 1.

Continuous Causticizing with Lime Recovery and Reuse

OUR apparatus is built for the specific purposes indicated in the above title. It is the work of our consulting engineer, who for nearly twenty-five years was general manager and chief designing engineer of one of the large alkali plants in this country. The apparatus has been in successful operation for some seven years, and is highly efficient, both as regards economy in the use of raw material, and saving in labor.

The complete plant which we furnish, consists, as indicated in the sketch, of a continuous causticizer, decanter, rotary filter, rotary kiln, gas producer, lime slaker and auxiliary apparatus such as vacuum pump, lime and liquor pumps and sludge agitator. All apparatus work continuously. The causticizer is heated with exhaust steam, and supplied continuously, by means of pumps, with calcium hydrate and sodium



carbonate in the proper proportions. The continuous discharge of caustic liquor and lime sludge is delivered by pumps to the decanters, the clear caustic drawn from the top and the mud from the bottom; delivered by pump direct to the sludge agitator from whence it flows to the filters. The dried filter cake is delivered by belt to rotary kilns fired with gas, from whence the recovered lime is returned to the slaker to be used again.

With good grade of lime, 90% of the sludge can be recovered. The alkali loss is with careful working, almost nil. All of the apparatus is of heavy construction, and specially designed for the work. The process being continuous the steam consumption is much less than that of the batch process, moreover the process does not require live steam, exhaust at 10 pounds pressure being ample to operate at maximum capacity.

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OF
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WATERPOWER DEVELOPMENT
STEAM POWER PLANTS.

PLANS AND SPECIFICATIONS
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Rag Room Equipment

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Hamilton Top Felts

run until worn out, with less trouble of "picking" on machine than any other make of top felts can show. A trial is invited

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HAMILTON, OHIO

The plea for a return to a practice of pricing wrapping or other papers as of time of delivery is favored by some mills which have had the rather unpleasant experience of booking orders for six weeks ahead at a price one-half cent per pound less than other mills were receiving, that had refused to book orders for such distant delivery. Before the six weeks period closed, an advance had occurred and the mill with the greatest amount of hangover business at the old price was likely to be the loser, especially as demand is large.

Freight Rate Adjustments Urged

A traffic case of more than ordinary interest concerns a short New England railroad, the Hoosac Tunnel and Wilmington Railroad, a short line running from west central Massachusetts into Vermont and serving among other industries the Mountain Mills plant of the New England Company, successors to the Parker Young Company of Boston. This mill is a producer of sulphate pulp and has had considerable trouble with obtaining through freight rates from points where its paper-making supplies originate. The contention of the company is that rates should be so adjusted that a through rate can be named on lime, coal or chemicals from shipping point to Mountain Mills instead of the several rates that are made now, especially to the junction of the short Hoosac Tunnel line with the trunk lines, and thence onward to the mill.

The case was argued before an examiner of the Interstate Commerce Commission in Boston last spring, the pulp mill being supported by the New England Paper and Pulp Traffic Association, C. H. Tiffany, traffic manager, of which the plaintiff mill is a member. Various exceptions to the report of the examiner have been filed and a further hearing has been indefinitely postponed. The case is of interest, however, for it illustrates how a mill much nearer its market than a competitor can, through the hit or miss system under which rates are formulated in New England, easily be driven out of markets that from the standpoint of service it should logically supply. The entire strength of the able traffic association, consisting of some thirty of the largest paper mills in New England, will be lent to obtain the desired concessions from the I. C. C.

While on the subject of traffic, it would be well to say a few words of the New England Paper and Pulp Traffic Association. This organization, which has its headquarters in Boston, represents about thirty of the leading paper and pulp mills in the New England states. It co-operates with the traffic departments of these mills in everyday traffic matters and represents the industry as a whole of these states in matters of general import. It is generally credited with being the strongest organization of its kind representing a single branch of industry.

It is at present completing a map of the paper industry covering the chief paper producing regions of the United States and Canada. This map has been prepared primarily for the benefit of the mills constituting its membership, but it is possible that other copies will be available to the trade at the cost price. The map will give the production figures of each paper mill town or city. It is about to be published.

Exports of paper from the port of Boston for the month last reported, September, were as follows: Paper bags to the value of $570; boxes and cartons, $2,221; carbon paper valued at $1,380; news print, 1,053,592 pounds, valued at $53,739, with the entire amount consigned to Cuban publishers; book papers shipped from here were valued at $540, a total amount of $3,736; tissue paper was valued at $9,485, the principal countries consigned to being as usual, Cuba and England; paper towels were shipped to the value of $3,226, and wrapping paper to the amount of 9,871 pounds, valued at $593, and writing papers shipped were valued at $1,999. Under the heading, all other papers exports were valued at $14,964.

According to the spruce wood department of the Great Northern Paper Company, Maine, it has 9,500,000 acres in her forest district and 4,500,000 outside this district. In view of the fact that so many people are filled with alarm at the disappearing Maine forests, it may be of interest to know that the amount of standing timber in the state is as follows: Spruce pulp, 9,610,000,000 feet, board measure; fir pulp, 1,945,000,000 feet, board measure; pine, 5,060,000,000 feet, board measure; cedar, 2,781,000,000 board feet; hemlock, 880,000,000 board feet; poplar, 1,123,000 cords, and hard woods proportionately as large.

The New Bedford property of the W. C. Jones Company has been sold to the New Bedford Storage Warehouse Company. This company, which became bankrupt last summer through the decline in market prices, had on its staff one of

Increased handling capacity at one-half the cost

To double your handling capacity and at the same time cut the unit cost in half is certainly worth while. The Brownhoist locomotive crane shown above is doing this at the paper mills where it is working. This crane handles 85 thousand feet of timber per day at a cost of 70 cents per thousand. This is against 45 thousand feet at a cost of $1.48 per thousand under the former method.

In addition to the speed and low cost of upkeep of Brownhoist cranes their great flexibility should be considered. Practically all kinds of materials can be handled anywhere as Brownhoists are made to operate on traction wheels or creeper trucks as well as railroad trucks. And the saving of handling materials by locomotive crane is usually as great or greater than the above.

Catalog K shows many types of Brownhoist cranes working in different industries. If you have any handling problems you will be interested in seeing how some Brownhoist owners are solving theirs. Write us. The knowledge of 40 years of crane building is at your service.

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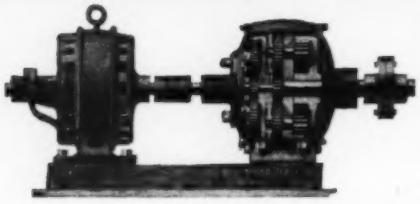

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Saves Space and Power and Safeguards Workers

Foote Speed Transformers enable you to reduce or increase electric motor speeds without the necessity of space-wasting pulleys, belts and shafting.

Their mechanism is entirely enclosed, thereby giving your workers positive protection against injury. There are many uses for Foote Speed Transformers that you should know about.

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Builders*—Paper and Pulp Mill Machinery—*for

INCREASED PRODUCTION **SERVICE ALWAYS**

the most prominent linter experts in the east, A. T. Smith, who had made a specialty of interesting the paper mills in the use of linters. The roofing felt mills had bought considerable tonnage of hull fibre linter but following the drop in the price of rags they stopped these purchases. Some of the book paper and writing mills in Massachusetts are still using a limited quantity of second cut bleached linter for paper making.

At the Orono, Me., mill of the International Paper Company, it is reported that a full crew of men are at work and that no more help was needed at that particular plant at this time. About 125 men are employed when the mill is running full, but capacity operations have been prevented by low water. With the advent of snow and rain, however, all paper mills of northern New England are reporting a vastly improved condition in the water supply of the streams. Another Maine mill of the International Paper Company which has secured nearly all of its old workers again is the big news and wrapping paper plant at Livermore Falls, Me. Towards the end of November, two foremen, four machine tenders, three back tenders, two scalers, a head cutter, a fireman and five laborers returned to work at Livermore Falls. The sulphite mill of the International at Chrishold reports capacity operations, and all machines at Livermore Falls, which number eleven, will probably be running throughout December.

The "Magazine of Contact," published by the Great Northern Paper Company from its Bangor, Me., office, in the December issue described the wonderful engineering feat performed by the Great Northern Paper Company at the Ripogenus Dam on the West Branch of the Penobscot River, where a sluice for logs 450 feet long with a 25 per cent grade shoots the logs along on their way to the big grinders at Millinocket. The magazine published by the social service department of the Spruce Wood Division has been prepared very largely for the men in the woods and is intended to bridge the office and the woods force. The eight numbers already published have insured the success of the effort and other paper companies of New England have considered a similar idea.

At a meeting held on Wednesday evening, November 16, at the Exchange Club, Boston, the Boston Paper Trade Association was treated to a very entertaining talk on Marshal Foch by Captain Andre Morize, professor of French at Harvard University. In addition to this a series of motion pictures taken by the S. D. Warren Paper Company at its Maine mills depicted the manufacture of paper from the standing timber in the woods to the finished product of the mills. Mr. Herbert Mason, treasurer of the S. D. Warren Company, is president of the Boston Paper Trade Association.

Receipts of Swedish wood pulp have been heavy at Boston during recent weeks and the largest single cargo ever brought direct to Boston on one vessel is due in this city early in December. She brings about 5,000 tons from Finnish and Swedish ports and is an American steamer, the Wathena. Shortly after, the Shickshinny will arrive with some 4,500 tons, a part of which is for Philadelphia consignees. The Boston agents for these steamers are C. H. Sprague & Son.

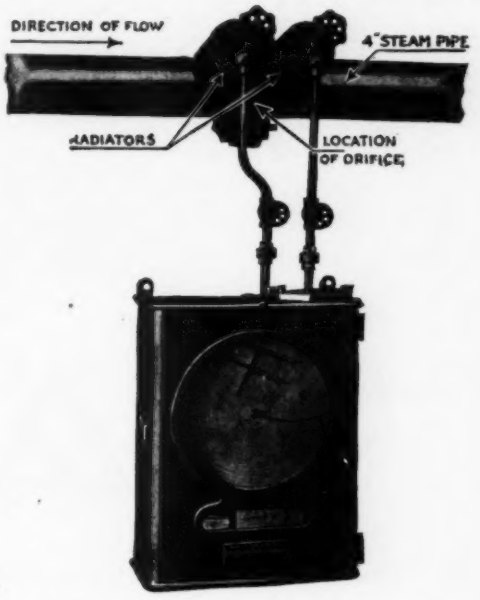
We hear that the Cowles heirs have stopped the transfer of the Bowdoin mill of the Pejepscot Paper Company, located at Topsham, Me. The mill has been shut down for an indefinite period pending readjustment of the company's affairs. About a year ago the mill came under the direction of a corporation headed by Julius Barnes and Herbert Hoover. The Cowles desire to retain this and resorted to the courts to stay proceedings and their efforts were successful.

Shipping sulphite and ground wood pulp direct from Quebec mills to Boston shows signs of increasing popularity over the all-rail shipments. Late in November about 10,000 bales of ground wood pulp and easy bleaching sulphite arrived in Boston from Ha! Ha! Bay, Quebec, the home of the Ha! Ha! Bay Sulphite Company.

The Train Smith Company of Boston, importers and dealers in paper manufacturers' supplies, are packing their own rags, bagging and other mill supplies in Chelsea, Mass., the home of the rag and bagging trade in New England.

An old flour mill near the mill of the Eastern Manufacturing Company at South Brewer, Me., has been purchased by the former company in order to obtain the excellent water rights enjoyed by the old company.

Bailey Fluid Meter



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They are the most practical and satisfactory meters for recording and integrating the flow of steam to turbines, digesters, paper machines and other processes. Steam can be measured at any pressure and temperature, exhaust steam included.

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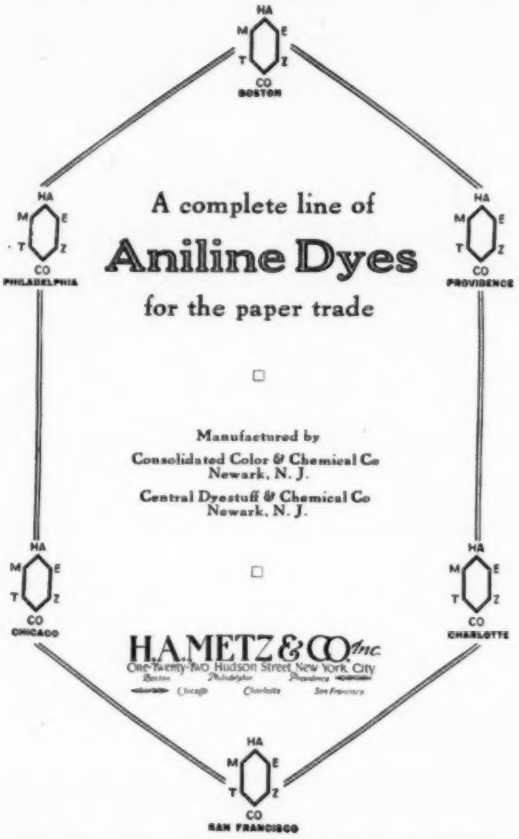

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A PERFECT SUBSTITUTE
FOR IRON FREE

Recommends No Immediate Change in Clay Tariff

Henderson Inches, general manager of the John Richardson Company, English china clay importers of Boston, states that in his opinion the situation on china clay from a tariff standpoint will not be materially altered before the tariff bill is enacted. Mr. Inches, acting for the John Richardson Company, was largely instrumental in obtaining the co-operation of several china clay importers in opposing an increase to $6 on clay which the southern producers were asking. In as much as certain paper mills have signified their inability of using any other material than English clays for coating purposes on the better grades of book paper, it is deemed a poor policy to place a high tariff on the material. The present duty is $1.25 per ton and the terms of the new tariff, according to Mr. Inches, would make it $2.50, which is a compromise with the extreme position of the southern makers. Purchasing agents of the S. D. Warren Company and the Orono Pulp and Paper Company are strongly opposed to an increase.

The paper stock market in New England has suffered a relapse of no small proportions during the late days of November. As we write, a decline to $24 per ton delivered, Maine and Massachusetts mills, on old mixed strings has taken place. The previous selling figure was $28. While seaboard manila rope is firm, according to the leading authority, Mr. L. Keith Southard, of the International Purchasing Company of Boston, he adds that talk to the effect of a price increase much above the present maximum of 5c shipping point is uncalled for. Rope has been in demand by paper mills making bag paper for the flour millers, but this business in so far as rope is concerned has been quite well anticipated by now.

Pulp wood in New England shows signs of slight improvement. In Maine the market is stiffening just enough to be noticed, with a few transactions at $10 to $12 per cord for spruce and fir rough, f. o. b. shipping point. The demand for pulp wood is generally unsatisfactory, however, and much paper making wood in Maine has gone into the manufacture of laths.

Roofing rags have dropped to $19 per ton, delivered the mill in New England, while waste papers, particularly folded news, are much cheaper. News sold towards the end of November at $10, f. o. b. cars Boston, to Massachusetts mills at a low freight distance.

Miami Valley

Dayton, Dec. 1, 1921.

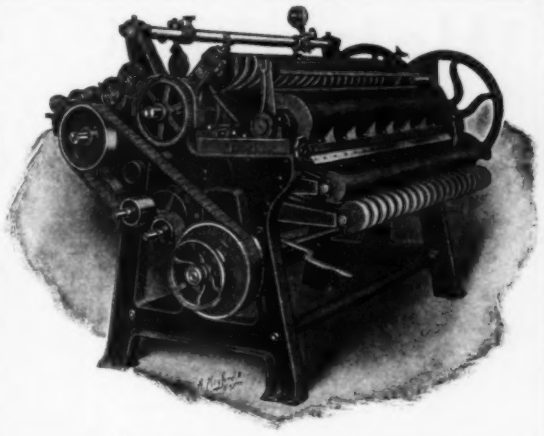
The tissue mills in the Miami Valley seem to be having the best of things at present. All of the tissue mills in the vicinity of Dayton are sold up to the first of the year, and in the position of refusing orders for less than four to six weeks delivery. Two of these tissue mills are increasing their sales force and are aggressively going after business. Then, too, the manufacturing world is finding new uses for tissue, which helps to increase the demand.

The board mills, although they are operating full time and have a number of orders on hand, are not yet in the position of refusing orders.

There is evidently not a very strong demand for book papers and fine writings, for some of the mills making this class of paper are either working part time, or anticipating a shutdown for part of each week. The only blotting paper mill in the Miami Valley is operating to capacity and has six weeks' orders on its books. The Valley's flour sack paper mill reports that business was never better with them, which may or may not be accounted for by the fact that they own their own bag factory, although they do not make enough paper to supply its demands.

The situation here in the Miami Valley cannot be summed up broadly, without making exceptions of the mills where conditions are directly the opposite to the majority. Some of the mills in every line are operating to capacity, and not far away will be another mill, making the same class of paper, that has been unable to operate more than five days a week.

There is a widely differing opinion among paper men as to the probable result of the raise in pulp prices, which was not as stimulating to trade as the pulp manufacturers expected. Some of the pulp salesmen predict a pulp famine because so few crews are going into the woods this winter, while others say there is enough pulp and pulp wood on hand to keep the mills going for two years. The price of paper being a competitive matter, depends not so much upon the cost of paper to the manufacturer, as it does upon whether or not each can meet the prices made by the other manufacturers



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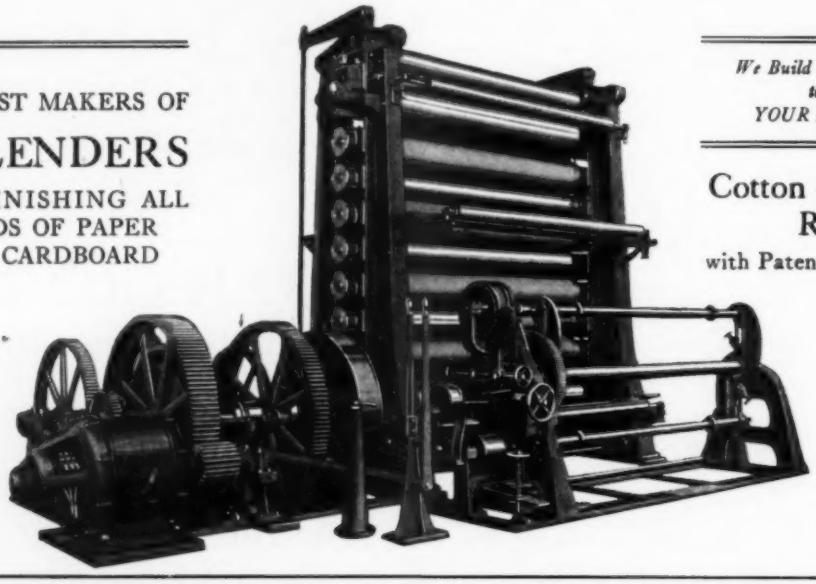

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CYLINDER FACES
WASHER WIRES
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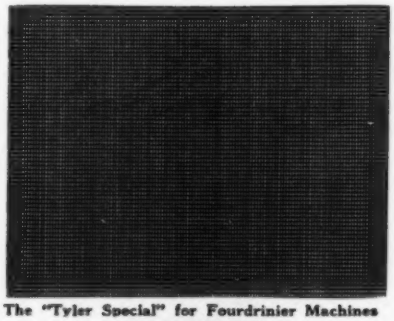
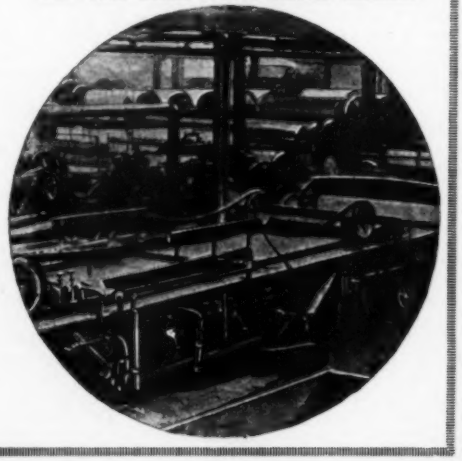
Tyler Wires run straight with no inclination of becoming slack at the edges.

Prices and samples will be mailed upon request.



The "Tyler Special" for Fourdrinier Machines



THE W. S. TYLER COMPANY

CLEVELAND, OHIO

and still take a profit. Paper men are all hopeful of being able to raise their prices slightly, but no one wants to make the first move. No one is willing to venture a prediction as to whether the raised pulp price will stick, and Miami Valley paper manufacturers say they are not contracting for their 1922 pulp supply until they are sure of the price.

Taken as a whole, the paper industries in the Miami Valley seem to be a very healthy condition, if outside appearances count for anything. Added to the evident signs of improving business is the optimistic tone of most conversations in the paper mill offices.

December and January constitute inventory time both for the jobbers and manufacturers, and any dropping off of business at this time is not taken to have a serious meaning, so that, while admitting that the demand for paper is not quite so brisk as it was during October and the early part of November, paper men feel no qualms about the slacking up of orders.

Every mill has taken the opportuntiy afforded by the dull season to bring its equipment up to first class condition, and is ready to handle the increased volume of business everywhere expected after January 1, 1922.

The Champion Coated Paper Company

Improvements go steadily on at the Champion Paper Company's mill at Hamilton, Ohio. Work on their new chemical building is progressing satisfactorily, a little ahead of the schedule time. The concrete structure is about 75% complete, and it is expected that the building will be ready for the installation of machinery about January 1st, 1922.

The announcement has just been made of the installation and successful operation of some condensation pumps, steam separators and a few valves on their big cylinder machine which has resulted in a much better quality of paper and a very much lessened consumption of steam. This system, which was installed by the Farnsworth Company, of Conshohocken, Pa., is designed to produce a rapid circulation of steam throughout the drives, and at the same time conserve the steam at the end of its work. Mr. G. S. Martindale, chief engineer at the Champion Paper Company, says that back pressure was reduced from 14 pounds to about a half pound. Another important thing about the installation is that the time of heating up on Monday morning has been reduced radically—from three or four hours to twenty minutes. The complete installation was made by the Farnsworth Company. In the short time that this new system has been at work, the Champion Paper Company say they have been getting larger quantities and a better quality of paper, as well as cutting the cost of operating.

In connection with their coating mill division, an old building has been converted to make a new satin white plant. This building has four stories, and has been made fireproof throughout by the addition of concrete floors, and is now complete, together with the clay elevators. The machinery is being installed. The small satin white plant is being removed from their No. 2 mill to the converted building, where it will be near the balance of the coating mill equipment.

The capacity of the new satin white plant will be no greater than the old installation, but the removal of the satin white plant from the No. 2 mill gives them a lot of additional space for paper mill use, and will facilitate the handling of the coating materials.

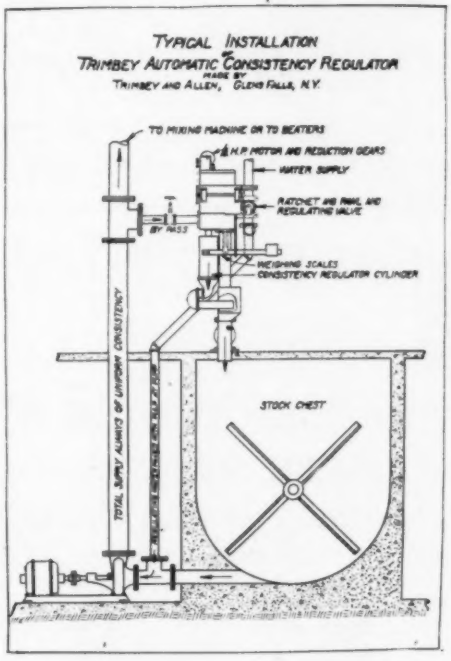
During 1921 the Crystal Tissue Company, of Excello, Ohio, has established warehouses and sales forces in five of the large cities. Stock is carried in all of these cities except Chicago. The names of the sales managers, and the addresses of their new branches are as follows:

F. W. Peterschen, 127 Federal St., Boston, Mass.
L. K. Mallinckrodt, 103 Cheapside, Baltimore, Md.
P. S. Calhoun, 18th and Hickory Sts., Kansas City, Mo.
E. M. Harford, 429 South Seventh St., St. Louis, Mo.
D. F. Peck, 866 Larrabee St., Chicago, Ill.

At the Crystal Paper Company, orders for colored tissue have fallen off to a great extent, but have been replaced with orders for white, and Joseph Cathcart, the general superintendent said that they have orders on hand which will keep them running on white only for six weeks or more.

Paper men who visit the Miami Valley will be glad to know that Middletown, Ohio, is to have a new hotel. The new structure, which is to have 115 rooms with running water and bath facilities for every room, is being financed by local men. It is to be located at Second and Broadway and will be ready for occupancy within a year. Work has been commenced.

Why Guess at Consistencies?



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It removes the main cause of uneven weights.

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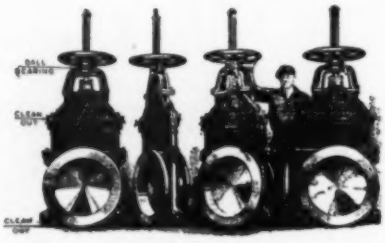

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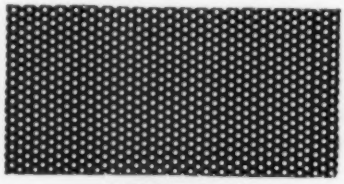
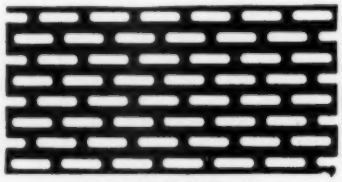
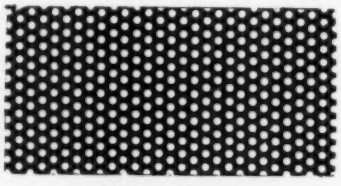


.065 inch round



⅛ x ½" Slots



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The St. Regis Paper Company and the Hanna Paper Corporation have established New York offices in the Central Trust Company building at the corner of Madison Ave. and 42nd St.

The inauguration of the New York offices is the direct result of the recent merger of the Hanna Paper Company with the St. Regis Paper Co., both of Watertown, New York. The New York force is in charge of Raymond J. Parham, who for some time has been at the head of the sales department of the St. Regis Paper Co.

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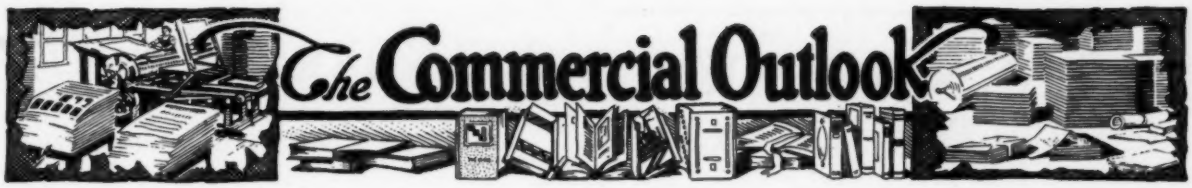

New York, Dec. 1, 1921.

ALTHOUGH retail business in many kinds of paper has slowed down to an extent, the market as a whole shows healthy activity of fairly broad dimensions, and everything would seem to point to the paper industry steadily assuming a more normal status. The somewhat quieter demand from many consuming sources during the past several weeks has failed to have pronounced influence on the market situation as a whole; jobbers continue to order supplies from mills in a more or less consistent fashion, consumers ars taking deliveries against back orders without hesitancy, and there is sufficient fresh buying to characterize the situation by a moderately lively complexion. Moreover, reports from producing centres generally tell of mills running full or nearly full, with the production of paper of practically all grades gradually becoming larger.

The recession of demand that has lately been noted in some quarters appears attributal chiefly to the efforts of certain paper consumers to reduce stocks in preparation for year-end inventories. There is no doubt that mnaufacturers and merchants in various lines are endeavoring to have their inventory show as favorable a return as possible at the close of this year, particularly since 1921 has been a twelvemonth beset by uncertainties and difficulties which will make annual reports for the current year at best unattractive. The slower demand for some kinds of paper therefore is viewed merely as temporary and lacking significance, and no one in the trade is worried over the situation. Instead, trade sentiment is distinctly confident; nearly everyone is optimistic, and expectations are rife for a marked pick up in demand within the next month and continued improvement in the industry at large.

No one can deny that news print is in a strong statistical position. Figures just at hand show that consumption of news print thus far this year is only about 4 per cent below that of last year, when a new high record of volume consumption was established. If anyone doubts that consumption is running heavy, he only has to note the size of most of the large daily newspapers of the country from day to day. New York publishers are printing larger papers at present than in a long time; one day this week a local newspaper printed an issue of 40 pages, while issues of 28 to 32 pages are a daily matter. Against this situation, production figures show that the output of print paper has fallen down to a considerable extent this year, due to strikes of mill operatives, which in some cases are still unsettled and thereby handicapping production. Estimated production of news print in the United States for 1921 is 1,200,000 tons, or fully 300,000 tons less than in 1920.

Members of the trade are mostly ignoring the bugaboo of German competition in news print. Moreover, import statistics do not support the belief that German paper can affect the American market to any great extent. Germany and Scandinavian countries will not export much over 100,000 tons of news print to the United States this year, it is reliably estimated, which tonnage is but an item of the 2,000,000 tons annually consumed in this country. The present depreciated value of the mark is permitting Germany to ship some paper to this market at cheap prices, but many of the prices mentioned from time to time are greatly exaggerated. For example, it has been said that American publishers have contracted for German news print at 2.50 cents per pound. Investigation of an authoritative character reveals that while manufacturers in Germany have accepted some orders at this price, they do not intend to deliver at any such basis; it being learned from a most reliable source that there is scarcely any probability of German news print being obtained by American publishers at less than 3 cents per pound for many months to come.

Canadian manufacturers have announced a reduction of $5 a ton, or a quarter of a cent per pound, in news print prices for deliveries over the first quarter of 1922, bringing the contract basis down to $75 a ton f. o. b. mills. Domestic producers have not yet made known their prices for the next quarter, but it is likely they will follow the lead of the Canadians and announce the same price of $75 per ton. A consensus of opinion in the trade is that news print prices are finally getting down to where they will most probably settle. There are few who look for print paper prices to fall below 3.50 cents, regardless of foreign competition and especially since sentiment is to the effect that paper will not be obtainable from European sources for less than 3 to 3.25 cents a pound.

One of the bright spots in the industry lies in container board, from which fibre shipping containers are fashioned. Demand for this description of box board has been exceedingly keen for several months, and mills have been more or less rushed in satisfying the wants of buyers. For a time many thought the brisk movement of container board was simply a condition brought about prior to the Christmas holidays, but demand is holding up so well that many are commencing to believe that this was no seasonal situation but that the growth of demand for such board is due to a lasting increase in the use of fibre containers for shipping merchandise. Folding box boards have been favored by a good demand also, and plain box boards have had a lively season though demand has slumped somewhat lately, which is a common occurrence as box manufacturers cover their pre-holiday orders for boxes. Prices on plain chip and news boards are down a little, chip being quoted at around $35 a ton f. o. b. New York and solid news board at about $40, but other grades of board rule firm and display an advancing tendency.

Book papers are holding their own in price at around a basis of 6.50 cents a pound on machine finished book, and are in fair demand, though the bulk of the present movement is to contract buyers. Kraft wrapping papers are firm at 7 cents a pound for No. 1 domestic kraft and half a cent less for the No. 2 grade. Fine papers are constantly improving their market position, and quotations incline upward, both because of a broader demand for bond and ledger papers and also because of the rising cost of raw material going into these papers.

Tremendous Losses from Forest Fires

There were 14,463 forest fires in the pulpwood regions of the United States during 1920, burning over 2,059,408 acres, according to a report compiled by the Woodlands Section of the American Paper and Pulp Association, in co-operation with th United States Forest Service.

The tremendous losses by fire tremendously handicap the paper manufacturers in their efforts to determine a future forest policy for this industry, for the problem of artificially planting new forests would be enormously minimized if the loss by fire in growing forests could be eliminated.

In the New England states alone there were 2,419 fires, of which 1,619 were in Massachusetts, 164 in Maine, 542 in New Hampshire, 54 in Vermont and 40 in Rhode Island. The area burned over in Maine was the largest of this group, being 39,803 acres. Fires this year have done even more damage, though no figures are yet available, and the same is true of New York. Here there were 479 fires in 1920, burning 35,176 acres.

In the group of states including Pennsylvania, Maryland, Ohio, Virginia, West Virginia, North Carolina and New Jersey there were 4,928 fires, of which 1,597 were in Pennsylvania and 1,644 in North Carolina. The total area burned over was 716,863 acres.

In the lake states of Michigan, Wisconsin and Minnesota, there were 776 fires, burning 597,910 acres, and in the great forest states of Washington, Oregon and California, there were 4,861 fires, burning 645,648 acres.

The total damage by these fires throughout the country was $6,319,641.

Col. W. B. Greeley, chief forester of the United States Forest Service, has said that if the forest fire menace could be eliminated, the problem of future forests for the country would be greatly simplified.

Canadian Export Paper Co. announces that the export price of newsprint for first quarter of 1922 will be $75 per ton against the prevailing $80 for the current quarter. This makes a cut of $55 from the high level created a year ago.

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Papermaking Rags

After experiencing a period of a month or longer of brisk activity, during which paper mills bought in fairly extensive volume and prices advanced with marked consistency, the market for papermaking rags has turned easier and there is a lack of important demand for most grades at present. Consumers have not let up in their buying entirely—they seldom, if ever, do at this time of the year when paper mills for the most part keep moderately active—but there is not the snap to the demand that obtained not so long ago and the aggregate movement of rags into mill channels is not heavy enough to sustain values. Prices have gradually slid off during the past few days until, in some cases, much of the advance scored within the last several months has been lost, and indications would seem to be that the end of the decline is not yet in sight.

From all accounts, the principal reason for the weakening of the market is that paper manufacturers, practically as a unit and along with various other manufacturers, are endeavoring to reduce stocks of raw material in preparation for the approaching inventory-taking season. Producers of numerous kinds of manufactured goods frankly admit they are desirous of their year-end inventories showing as small stocks of both finished and raw material as possible this year, so that annual reports may be braced up somewhat following a year of very unfavorable manufacturing conditions. For this reason, current purchases of raw material are almost solely against immediate and actual requirements, with the result papermaking rags are wanted in much smaller lots. Under such circumstances there are numerous dealers who, appreciating ruling conditions, are not pressing rags onto the market and are pursuing a waiting policy in the confident belief better times are in store, but there are also others who are freely marketing rags at whatever prices can be realized, thus giving an easy undertone to values.

The supply situation in rags is not unfavorable from the consumer's point of view, yet it appears that available stocks of papermaking rags are not unusually large. There is little question that collections of rags have been comparatively light during the last half year, and some kinds of sorted stock are held in rather light amounts at present. As regards roofing rags, for instance, a very bullish sentiment prevails among those handling this class of rags, it being expected that the tremendous amount of building being done all over the country will eventually make for a large consumption of roofing papers and that felt paper mills will soon find it necessary to come into the market for heavy supplies of rags. There are many who look for quite a boom in roofing rags, together with the higher grades of papermaking rags, soon after the turn of the year, it being anticipated that with mill stocks purposely diminished consumers will seek to augment their holdings shortly after inventories have been compiled. That this view is shared by at least some paper manufacturers seems to be proven by certain consumers quietly placing orders for rags which they do not immediately need or involving supplies for future delivery.

New cuttings of mostly every kind have eased off in price. White shirt cuttings of No. 1 quality, which at one time recently were held by dealers at 11 cents per pound and higher at shipping points, are now offered at 10 cents, while unbleached muslins are available to mills at 8.75 cents, white lawns at 8.50 cents, washables at 3.75 cents and blue overall cuttings at 6 cents. Roofing rags have sold in the East down to 90 cents per hundred pounds at dealers' points for No. 2 packing, and at around $1 for No. 1 grade. Old whites are slightly lower in price, as are old thirds and blues.

Average quotations f. o. b. shipping points follow:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	10.00-10.50
White shirt cuttings, No. 2	6.50- 7.00
Fancy shirt cuttings	6.00- 6.50
Washables, No. 1	3.75- 4.00
Unbleached muslins	8.75- 9.25
White lawn	8.50- 9.00
Overall cuttings, blue	6.00- 6.50
Black silesias	3.25- 3.50
Old Stock—	
Whites, No. 1 repacked	5.50- 6.00
Whites, No. 2 repacked	3.50- 4.00
Whites, house soiled	1.65- 1.85
Whites, street soiled	1.50- 1.65
Thirds and blues, repacked	1.75- 2.00
Thirds and blues, rough	1.35- 1.50
Black stockings	2.15- 2.40
Lace curtains	4.40- 4.60
Cotton canvas, No. 1	3.75- 4.00
White cotton batting	1.75- 2.00
Roofing, No. 1	1.00- 1.25
Roofing, No. 2	.90- 1.15

Rope and Bagging

Old rope is at least one description of papermaking material which is holding firm in price and which displays fair market activity. Consumers are buying in a rather consistent manner, and despite the fact that imports of old rope have increased appreciably in recent weeks, available supplies do not appear to be any too large to fill buyers' wants, with dealers laying a good deal of stress on the lack of sizable accumulations in warehouses. Old manila rope in No. 1 condition is selling to paper mills at 5 cents a pound at shipping points and ex dock. Now and then transactions are recorded at slightly under this price basis, but most of the rope traded in at present is bringing very close to 5 cents, and dealers are plainly reluctant to book orders involving large amounts of rope for future delivery. Mixed strings are quotably steady at around 85 cents a hundred pounds, and are in moderate demand.

There is little volume to the demand for old bagging. Some coarse paper mills are absorbing supplies in a small way and experience no difficulty in purchasing at about their own prices, which situation reflects the rather heavy stocks of this material in dealers' hands. No. 1 scrap burlap is quoted at 90 cents per hundred pounds and less, and old gunny bagging at from one cent per pound upward.

Quotations f. o. b. shipping points are:

	New York and Chicago
Gunny, No. 1 domestic	1.10-1.25
Gunny, No. 1 foreign	1.00-1.15
Scrap bagging, No. 1	.85-1.00
Roofing bagging	.70- .80
Wool tares, heavy	1.50-1.75
Wool tares, light	1.25-1.50
Manila rope, No. 1 foreign	4.75-5.00
Manila rope, No. 1 domestic	4.75-5.00
Sisal strings	1.50-1.75
Mixed strings	.80- .90

Old Papers

Prices on old papers have been almost steadily on the decline for the last three or four weeks and have gradually worked down to levels where some grades are very nearly at the low points obtaining prior to the sharp rise of the market during September and October. The main cause of the downtrend has been a slowing up of demand from consuming quarters. Paper and board mills in various parts of the country have let up in their buying after operating actively in the market for quite a period, and, as is invariably the case when demand for waste paper diminishes, prices quickly turned easy and commenced to slide down. Within the last few days the market has steadied to an extent, though this seems due more to packers having decreased their output than to any broader buying movement. The immediate outlook is rather difficult to figure. Many in the trade look for mills to continue purchasing in limited amounts for the balance of the year; after which they expect demand to increase and prices to regain at least a part of their recent losses.

The market is devoid of interesting feature. Quotations are very irregular—in the sense that some grades which are wanted by mills in relatively larger volume than others and which are held in lighter supply are commanding prices proportionately above those other grades are selling for. Shavings are fairly high in price. Dealers are asking 3.50 cents a pound and more for No. 1 hard white, and at least 3 cents for No. 1 soft white shavings, with some sellers, particularly in

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The Pulp and Paper Trading Co.
21 East 40th Street New York City
Dealers in Domestic Chemical and Mechanical Pulps and Paper

AGENTS FOR
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Canadian Kraft, Ltd.
Dealers in Wayagamack Kraft
Three Rivers, Canada
Ware Coated Paper Company, Ware, Mass.

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BOOK AND COATED PAPER
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STANDARD BLEACHING POWDER

Manufactured by
Pennsylvania Salt M'f'g Co.
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Bleached and Unbleached
WOOD PULP
of Every Description
M. GOTTESMAN & COMPANY
INCORPORATED
18 East 41st Street NEW YORK, N. Y.
Established 1886

the Middle West, quoting substantially beyond these levels. Old kraft paper holds moderately steady at from 2 cents per pound upward at dealers' shipping points, and white blank news cuttings are freely bringing 1.90 cents a pound. Books and magazines are easy, and are fetching no better than 1.25 cents per pound for No. 1 heavy books in the East. Folded news is quoted at about 65 cents per hundred pounds in the East and from $2 to $3 a ton higher in the West, while old No. 1 mixed paper is selling at a price range of 45 to 55 cents a hundred. Old manila papers rule fairly firm, due to a good demand for such stock from container board mills.

Quotations f. o. b. shipping points are:

	New York and Chicago
Hard white shavings, No. 1	3.50-3.75
Hard white shavings, Nos. 2-3	2.50-3.00
Soft white shavings	3.00-3.25
Colored shavings	1.50-1.75
Heavy book, No. 1	1.20-1.40
Crumpled, No. 1	1.00-1.10
Ledger stock	1.65-1.85
Kraft, No. 1	2.00-2.15
Manilas, No. 1	1.00-1.10
White blank news	1.90-2.00
Overissue news, No. 1	.80- .90
Folded news	.65- .75
Mill wrappers	.70- .80
Box board cuttings	.55- .65
Mixed paper, No. 1	.45- .55
Common paper	.30- .35

Chemical Pulp

The feature in chemical wood pulp is the strength evinced by bleached sulphite and kraft pulp. Leading domestic producers of bleached sulphite have advanced prices on No. 1 bleached to 5 cents per pound at pulp mills, effective on all shipments from December 1, representing a rise of something like three-quarters of a cent per pound from the basis previously prevailing. Demand for this kind of pulp is quite active. Fine paper mills are buying steadily and in good volume, and it is understood that a majority of producers have their entire production for December under contract with consumers. One reason for this sharp advance in bleached sulphite prices is said to be the desire on the part of domestic manufacturers to return to their old policy of disposing of their pulp output on contract a good ways ahead, thus doing away with the plan in force for the last year or so of selling month by month. In other words, it is stated that producers of strictly No. 1 domestic bleached sulphite are perfectly willing to make commitments covering deliveries of their product for practically the entire year 1922 at 5 cents per pound, and that by raising prices to this level and promising to maintain them at this point, consumers will be encouraged to order pulp well in advance of their requirements instead of purchasing month by month on a readjusted price basis as they have been doing for some time or since the pulp industry has been undergoing the process of deflation. How this plan will work out is problematical especially since foreign pulp competition is playing such an important part in the market here at this time.

Kraft pulp is moving freely at prices ranging from 2.75 to 3 cents a pound at producing plants, with several of the largest domestic manufacturers reported sold up for several months ahead at the higher figure. Container board mills are buying in good volume, and there is also a fairly steady call for kraft from wrapping paper manufacturers. Easy bleaching quotations have strengthened as a result of the advance in bleached sulphite and now range from 3.25 to 3.75 cents per pound at pulp mills, while news grade sulphite meets with a comparatively good demand at from 2.50 cents upward.

F. o. b. pulp mill quotations follow:

Bleached sulphite	5.00-5.25
Easy bleaching sulphite	3.25-3.75
Unbleached sulphite, No. 1	2.75-3.00
News grade sulphite	2.50-2.75
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.50-4.00
Kraft, No. 1	2.75-3.00
Screenings, refined	.85-1.00

Mechanical Pulp

Reports concerning the ground wood market are somewhat at odds. Some tell of a consistently good demand, with consumers meeting the prices asked at slightly higher levels than formerly obtained, while others are to the effect that users have apparently covered their needs for a while and are now buying in limited tonnage. This much can be said,

35 Ton Pulp Mill For Sale

We must move our Pulp Mill Equipment immediately and have fixed our price to effect quick sale

Major Equipment Consists of the Following:

6 Digesters, soft steel plate, welded joints, inside dimensions 8' dia. x 27' overall, test pressure 165 lbs., capacity 1500 cu. ft., cradles, columns, false bottoms and heads included, (3 Digesters constitute a unit and the three additional Digesters may be reserved as spares).

3 Morterud Liquor Heaters, 44" dia. x 11'6" high, with flow piping to Digesters.

3 Centrifugal Pumps with water cooled bearings, 5" suction and discharge for Liquor Heaters.

1 Horizontal Centrifugal Pump with water cooled bearings, 3" suction and discharge.

2 Tanks, Liquor Measuring, steel ¼" plate sides, ⅜" bottom, inside dimensions 10' dia. x 12' high, 5" outlet at bottom, with coils of 3" extra heavy steel pipe, 12 windings 8' dia. x 8" pitch with welded connections.

1 Pump, Centrifugal, Horizontal, vertical discharge, 5" suction, 4" discharge, for pumping liquor from heating tanks to digesters.

1 Pump, Centrifugal, Horizontal, vertical discharge for pumping black liquor, 4" suction, 3" discharge.

1 Cyclone Separator Tank, ⅜" plate, 12' dia. x 9' high, in cylindrical part, conical bottom with sides sloping 45°, swing pipe to diffuser included (knocked down).

1 Condenser, ¼" plate, 6' dia. x. 14' high in cylindrical part. Butterfly valve and pipe connection to Cyclone Separator included.

1 Tank for hot wash water, 3" wood, 12' dia. x. 12' high inside.

7 Diffusers, 7/16" plate, sides, top and bottom of ½" plate, 10' dia. x 16' high inside. Head, door and false bottom included.

1 Stock Chest Agitator, made up of 16 Oak paddles with split C. I. hub clamped on 4 1/8" dia. shaft, gears and back shaft included.

1 Stock Pump, duplex vertical plunger type, 10" dia. plunger x 28" stroke, 8½" ball valves, 10" suction x 10" discharge (not complete).

1 Elevator, electric, worm gear and drum, capacity 7500 lbs., platform 10' x 10', 36' lift (Motor not included).

1 H. P. Motor, Incidental valves, fittings and connections.

WRITE WIRE PHONE

Sales Department

Charleston Industrial Corporation

Nitro, West Virginia

Appleton

Felts & Jackets

We have for a long number of years furnished felts for some of the largest pulp, board, news and writing mills in the country.

Manufactured By

APPLETON WOOLEN MILLS

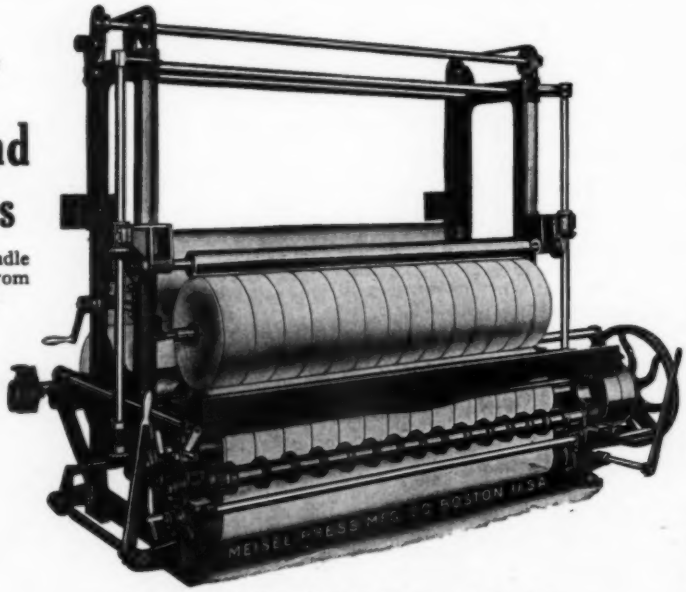
APPLETON ·· —— ·· WISCONSIN

Manufacturers of

Slitters and Rewinders

Any width, to handle any weight paper from tissue to cardboard.

Rolls up to 40 inches in diameter



Series OM Medium Weight Slitter and Rewinder

Manufacturers of

Adjustable Sheet Cutters

for tissue, waxed and other papers.

Rotary or Bed and Platen Presses

for printing all classes of paper, tissue to cardboard.

MEISEL PRESS MANUFACTURING CO.

948 Dorchester Ave., Boston 25, Mass.

that available stocks of ground wood are not excessive; if anything, unsold holdings in producers' hands at present are probably a good deal below normal. Furthermore, unfavorable water conditions prevent many grinders from increasing their production, and those having pulp stored are not exerting extra effort to liquidate these supplies, with the result a steady tone characterizes prices.

Around $31 to $32 per ton at grinding plants is the quotation usually named on domestic and Canadian prime spruce ground wood, freshly ground, for prompt shipment. Some sales continue to be made down to $30, but on the other hand, transactions up to $34 and even $35 have been reported recently. F. o. b. mill prices depend on the distance between seller and buyer, with quotations as a rule figuring out in the close vicinity of $40 a ton delivered at consuming points.

Chemicals

Usually at this period of the year paper and pulp manufacturers are engaged in making contracts involving chemical supplies for the larger part of the new year, but this year there is quite a reluctance shown to ordering goods very far ahead. This condition seems to meet with favor among producers of chemicals, who evidently are just as indisposed to entering commitments covering future deliveries a long time hence because of the many existing uncertainties affecting the market. Business in chemicals therefore is largely of current variety, with transactions involving principally small lots directly required. Prices in a majority of instances are holding fairly steady at approximately the following ranges:

Alum, lump ammonia	3.50- 3.75
Alum, lump starch	4.00- 4.25
Blanc fixe, powdered	3.50- 3.75
Bleaching powder (domestic drums)	2.00- 2.50
Brimstone (ton)	16.00-18.00
Casein	6.50- 8.50
Caustic soda, spot delivery	3.75- 4.25
China clay, domestic washed	8.00-10.00
China clay, foreign	15.00-20.00
Rosin, grade E	5.85-
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	2.00- 2.25
Sulphite of alumina, commercial grade	1.75- 2.00
Starch, papermakers', in bags	2.20- 2.40
Talc (ton)	15.00-18.00

The Mayer Coating Machines Company, Inc., are located in their new building on the outskirts of the city of Rochester, N. Y., on Scottsville Road, the main thoroughfare between Rochester and Buffalo, between the Barge Canal and the Pennsylvania Railroad. The property consists of 20.5 acres, and the building is 330 feet long by 128 feet wide in the rear, making something over 30,500 square feet of floor space. The company is operating on Niagara power, furnished by the Niagara Gas and Electric Corporation, and use their boilers only for heating purposes. The heating plant is a Vento System furnished by the Ilg Electric Ventilating Company of Chicago, and is the first heating system these people have installed in Rochester. The building is located on the Pennsylvania Railroad from which the cars are switched right into the plant.

Blake & Decker, Inc., paper dealers, who for the past three years have been located at 501 Fifth avenue, New York, removed this week to 50 East Eleventh street where in addition to the offices they will occupy 6,000 square feet of warehouse space. In addition to their present mill shipment business they will now carry in stock a general line of writing and printing papers and have secured the sales agency for a number of mill lines. The new telephone number is Stuyvesant 9600.

Atlas, Ideal and Victor Reducing Valves, Pump Governors, Pressure Regulators, Hot Water Tank Regulators, Control Valves and Damper Regulators are described in Junior Catalogue No. 21 just published by the Atlas Valve Company, 282 South Street, Newark, N. J. This little catalogue of 20 pages gives complete information—illustrates, describes, lists all sizes and gives prices. A copy will be sent free on request to any reader of this publication.

The Lagerloef Trading Company, Inc., pulp and paper importers, have removed their New York office to more spacious quarters on the seventeenth floor of the Vanderbilt Concourse Building, 52 Vanderbilt Avenue (opposite Grand Central Station at 45th Streets), where they will be pleased to welcome their many friends. Their telephone number remains the same as before, Murray Hill 4246 and 4247.

Standard Ultramarine Blues
For the Paper Industry
ASK FOR SAMPLE OF
NEOS R BLUE
The Highly Alum-Resisting Ultramarine
AGENTS
E. M. & F. WALDO, 10 High Street, Boston, Mass.
THE WESTERN PAPER MAKERS CHEMICAL COMPANY
Kalamazoo, Mich.
Manufactured by
THE STANDARD ULTRAMARINE CO.
Huntington, West Virginia

GENERATORS FOR SALE
Immediate Delivery
2-1000 k. w. General Electric Turbo Generators. Curtis Turbine, single stage, non-condensing, 175 pound steam pressure, 6600 volts, 3 phase, 60 cycle, 3600 R. P. M., 80 per cent power factor
THESE GENERATORS *are in* PERFECT CONDITION
WRITE—WIRE—TELEPHONE
Sales Department
CHARLESTON INDUSTRIAL CORPORATION
NITRO, WEST VIRGINIA

SPECIAL TANK OFFERING
Priced Low for Quick Movement
In order to make room for new incoming industries, we must remove all tanks from our buildings not later than December 31st, 1921.
Item 39113—4 vertical tanks, 15′ dia. x 7′, capacity 9,500 gallons; first grade all heart yellow pine. Staves and bottom 3″ thick. Iron reinforcing hoops ¾″ diameter.
Item 39112—10 vertical tanks, 13′ dia. x 18′ capacity 18,000 gals.; first grade all heart yellow pine. Staves and bottom 3″ thick. Iron reinforcing hoops, ¾″ diameter.
Item 39107—350 vertical tanks, 9′ x 10′, capacity 5,000 gals.; first grade all heart yellow pine. Staves and bottom 3″ thick. Iron reinforcing hoops ¾″ diameter.
Item 39115—50 vertical tanks, 15′ x 16′, capacity 21,000 gals.; first grade all heart yellow pine. Staves and bottom 3″ thick, ⅞″ iron hoops. Tanks equipped with paddle agitators complete with bevel gears and driving pulleys.
Item 39115-A—10 vertical tanks, 15′ dia. x 16′, capacity 21,000 gals.; first grade all heart yellow pine. Staves and bottom 3″ thick, ⅞″ iron hoops.
The above items at sacrifice prices
For complete specifications, prints, etc.,
WRITE WIRE PHONE
Sales Department
CHARLESTON INDUSTRIAL CORP.
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Plamondon Transmission Machinery

Products

Heavy Gearing and Friction Clutches for paper-mills, rubber-mills, tubemills, cement-mills, rolling-mills, stone quarries, and rock products, mining and coal-handling machinery, elevators and malt houses, turbines and water wheels, sugar refineries, packing houses, electric light plants, powder-mills, glass factories; cut gears and machine molded gears of all kinds.

Shafting, pulleys, hangers, couplings, collars, pillow blocks, worm-wheels, fly-wheels, and rope sheaves.

Makers of grey iron, and semisteel castings by analysis.

Special machinery built to order on modern tools at usual shop rates.

A. Plamondon Manufacturing Company

Engineers, Founders, and Machinists

Established 1859—Incorporated 1877

Works and Main Office:

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Emergency Orders Receive Special Attention

LISBON PULPSTONES

Quantity Unlimited Quality Unsurpassed
Guaranteed to Give Satisfaction

A free cutting Pulpstone that will produce more Pulp and withstand speed and pressure.

Magazine Grinder Stones in All Sizes

Samples and Quotations on request

The Smallwood-Low Stone Co.

World's Largest Producers of Pulpstone

LISBON, OHIO, U. S. A

New Papers

Writing—	
Write rag	14-40
White sulphite, No. 1	9-20
Colored	12-40
Ledger—	
White rag	15-50
White sulphite	11-25
Colored sulphite	13-25
Colored rag	17-50
Bonds—	
White rag	12-40
White sulphite	8-20
Colored sulphite	10-22
Colored rag	14-40
Book—	
No. 1 S. & S. C	6.75- 7.25
Machine finished	6.25- 6.75
English finished	6.50- 7.00
Coated and enameled	9.00-10.50
Lithograph, M. F	10.00-12.00
News Print—	
Rolls, contract	4.00-
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.50- 3.75
Cover Stock—	
Coated, both sides	9.25-
Coated, one side	9.20-
Tissue—	
No. 1 white, 20x30	.90- 1.10
No. 2 white, 24x36	.80- .90
No. 1 manilla, 24x36	.80- .90
Kraft	.90- 1.15
Wrappings—	
No. 1 kraft	6.50- 7.00
No. 2 kraft	6.00- 6.50
Boards—	New York and Chicago
Solid news	40.00-45.00
Straw	45.00-50.00
Plain chip	35.00-40.00
White coated chip	60.00-70.00
Manila coated chip	55.00-60.00
Binders' board	70.00-80.00

National Forestry Program Committee to be Heard

The whole American forestry question will be threshed out before the Agricultural Committee of Congress in a solid week of hearings beginning January 9.

This is the announcement made by Chairman Haugen of that committee and comes as the climax of a year of work by the National Forestry Program Committee to get a thorough plan for the maintenance of the nation's forests before Congress for action.

It is just a year ago that the National Forestry Program Committee was named, with the paper industry, as represented by the American Paper and Pulp Association, the lumber industry as represented by the National Lumber Manufacturers' Association, the public as represented by the American Forestry Association, the publishers as represented by the American Newspaper Publishers' Association, and other national and local groups, as members of the committee.

From this union of widely different interested groups, all realizing the need for unified action in behalf of the forests, came the Snell bill, in which the widely differing ideals of different groups were harmonized in the first comprehensive plan for forestry legislation to be offered in Congress.

Hearings last January came as Congress was about to adjourn, and action went over to the sixty-seventh Congress, where Congressman B. H. Snell again introduced his forestry bill, as approved not only by the Federal Forest Service, the American Forestry Association, the American Paper and Pulp Association, the American Newspaper Publishers' Association, but also by the National Lumber Manufacturers' Association, the American Association of Wood Using Industries, and other similar groups.

The introduction of essentially the same bill, carrying in addition a provision for federal assistance in establishing roads of remembrance trees, followed in the Senate, Senator Medill McCormick of Illinois being the sponsor.

In all this campaign the paper industry has figured as one of the leaders. Its program outlined a hearing before the committee was formed, was adopted in principle, and the Central States Forestry League, consisting of the eight states of the lake region, has practically accepted for the central states program, the recommendations of the forestry committee of the American Paper and Pulp Association of which Frank L. Moore is chairman.

Rush Work on U. P. Co. Peoria Mill

Installation of machinery to handle an annual output of 15,000 tons of paperboard is now being pushed at the United Paperboard Company's plant in Averyville, suburb of Peoria, Ill., on the site of the building destroyed by fire November 7, of last year, when one man lost his life.

The new building is 300 by 60 feet, 12 feet wider than the destroyed building. Fireproof construction is being used throughout. The cost of the building is estimated at $160,000, Peoria concerns being awarded the majority of contracts.

Normally the company will employ about 100 men. A force of 35 men has been employed during the last two weeks in building work.

To insure an output of 15,000 tons of paperboard it will be necessary to cook about 25,000 tons of straw annually, and use an equal amount of coal.

The Averyville unit is one of fourteen plants throughout this country and Canada controlled by the United Paperboard Company, with home offices in New York. William H. Shew is superintendent of the plant and Robert W. Cameron is treasurer.

Canada Exports Less News Print

In October the United States took Canadian news print to a value of $5,233,250 and pulp valued at $2,164,008. Total Canadian pulp and paper exports for the month were $8,954,226, a decline of $502,802 compared with September. Exports of news print for the month totaled 1,314,157 hundredweight, against 1,288,089 hundredweight last year, an increase of 26,068 hundredweight, and exceeded September by 190,021 hundredweight. They lost in value $1,464,690 compared with a year ago.

Exports of pulp of all descriptions for the month fell 243,162 hundredweight in quantity and $4,490,235 in value, compared with last year, and 56,388 hundredweight in quantity and $594,914 in value compared with September.

Exports of pulp wood amounted to 47,023 cords, valued at $587,574, compared with 124,390 cords, valued at $1,752,923, in October last year, and with 49,608 cords, valued at $664,420, in September.

In seven months the United States has taken pulp wood valued at $6,134,459 against $9,556,255 in the 1920 period.

The Watertown office of the Newton Falls Paper Company has been moved to the mill at Newton Falls, N. Y. The mill is now producing forty tons of super calendered book paper for the use of the owners, the McGraw-Hill Company, Inc., and the United Publishers Corporation, both of New York City. Mr. Arthur J. Baldwin, vice-president of the McGraw-Hill Company, has been elected president of the company, and Mr. Harry D. Eliason has been elected vice-president and treasurer.

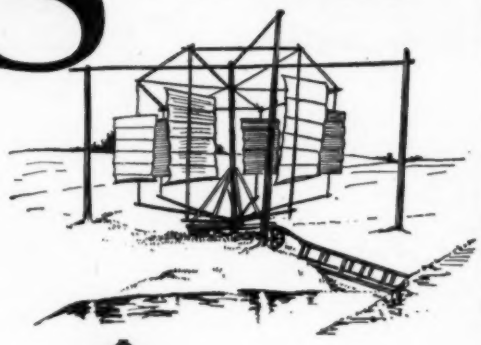
The Union Manufacturing Company, Oconto Falls, Wis., which is the hydroelectric power division of the Continental Paper & Bag Mills of New York, and serves the paper mills at Oconto and Marinette, Wis., will start work shortly on additions to increase the capacity from 1500 h. p. to approximately 2750 h. p. Details of the improvement are now being completed.

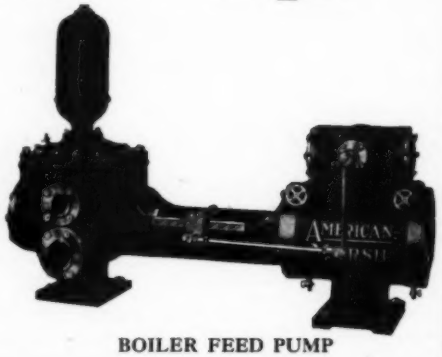
PUMPS

THE ancient Chinaman didn't believe in doing anything he could get natural forces to do for him. In this peculiar windmill pump—for pumping salt water—the wind drives the mill, the mill drives the pump, and the sun does the rest, by drying out the salt. In this way, the Chinese "manufactured" large quantities of salt in a cheap way.

American-Marsh Pumps are economical—in a modern, scientific manner. They have no unnecessary parts—no internal stuffing boxes, no tappets, no slide valves. Write for Bulletins describing pumps for paper mill service.

The Chinese Windmill is almost as peculiar as it is primitive.





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American Steam Pump Co.

BATTLE CREEK, MICH.

Chicago Office:
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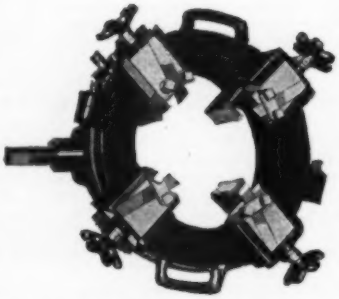
The American-Marsh line also includes Centrifugal Pumps, Power Pumps, Air Compressors, Vacuum Pumps, Condensers, Deep Well Engines, Stock Pumps.

The "TOLEDO" Line of Geared Pipe Tools



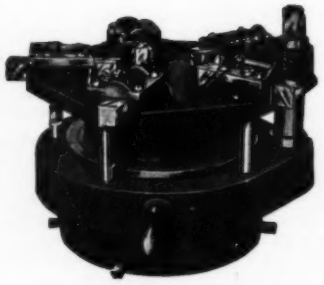
"Toledo" Geared Pipe Cutters

These popular geared cutters have a capacity of 2½" to 6" in one model, and 7" to 10" in the largest model. Fitted with knife cutters. Are portable. Can be split to encircle pipe already installed. Severs pipe quickly leaving clean, square end without burr. One man can operate them with ratchet handle. Their greatest speed and efficiency can be gained by use of our Power Drive.

WHERE fast, accurate, heavy duty pipe threading and cutting must be done, your pipe house can be equipped with no better tools than the famous "Toledo" line. They offer everything to be desired—portability, capacity, ease of operation and durability. Additions or replacements in your pipe tools should not be made until you have fully investigated the complete "Toledo" line. Send for new catalog "F."

"Toledo" Power Drive for Geared Pipe Tools

Used instead of ratchet handle. Attaches and detaches just the same. Operates threaders and cutters five times faster than by hand. Send for bulletin.



"Toledo" Geared Threading Devices

Four models comprise the "Toledo" line of geared Pipe Threading Devices. The combined capacity ranges from 2½" to 12" pipe inclusive. They are conceded by leading pipe fitting contractors to be the most efficient threading devices on the market today. One man can operate any model, including largest size. Are portable. Cut true, clean, accurate threads. Operated with ratchet handle or with "Toledo" Power Drive.

New York Office
50 Church Street
New York City

The Toledo Pipe Threading Machine Co. Toledo, Ohio

Wood Pulp

Importations of wood pulp from European sources have continued to mount and there has been more business done in foreign sulphite, kraft pulp and ground wood during the past few weeks than probably at any time since prior to the war. At the moment demand for pulp has slowed down to an extent, paper manufacturers presumably having covered their requirements by recent purchases, but there still is considerable trading current, while pulp against back orders is moving forward freely and in fairly large tonnage.

From all accounts, prices at primary centers are strengthening. Ground wood has advanced sharply abroad, and importers, who up to a short while ago were buying readily at around $30 per long ton, now state they are obliged to meet prices ranging between $36 and $39 a long ton in the Scandinavian countries and Germany. Foreign bleached sulphite has risen in value, partly because of the marking up of prices on domestic pulp of the same description and partly owing to higher primary prices. Importers at present are quoting between 4.25 and 4.50 cents per pound ex dock at New York or other American Atlantic ports for No. 1 bleached sulphite, and prices evince a tendency to advance to within closer proximity of the prevailing domestic price basis of 5 cents per pound for No. 1 sulphite. Scandinavian kraft pulp is selling to American paper mills at 2.60 to 2.85 cents a pound ex dock, with the bulk of supply bringing near to the higher figure. In fact, some sales of extra strong kraft pulp of Swedish origin have been recorded at as much as 3 cents per pound on the dock.

Heavy arrivals of pulp from Sweden at this season is not uncommon as Swedish manufacturers usually endeavor to ship out as large supplies as they can find a market for at this time of the year, or just prior to the closing of the Baltic. The large importations of the last few weeks therefore have not weakened the market here; on the contrary, consumers in this country have shown increased buying interest and have given added attention to covering their wants for a time ahead. Late advices from Sweden say that navigation over the Baltic is likely to be stopped any day now that cold weather has set in there. For a time it appeared as if the pulp-shipping season might be prolonged somewhat this year, owing to mild weather, but a week or so ago winter weather set in with a vengeance, so that news of the Baltic being frozen may be received very soon.

Swedish pulp trade authorities who have lately arrived in New York give it as their opinion that there is little probability of pulp prices declining in Sweden for some time to come. These authorities point out that accumulations of pulp in Sweden have been pretty well liquidated during the heavy movement from Sweden to the United States recently, and that European buyers, among them the English and French, who look to Sweden to fill their pulp requirements, will shortly come into the market to buy, especially since the feeling is growing in Europe that stocks in Scandinavia have been greatly diminished. Demand from such sources, it is contended, will serve to more than hold up prices; in fact, it is argued that when this demand reaches its full force, which is expected between now and next spring, prices will advance.

German pulps continue to arrive in this country in fair amounts. Several import houses in New York who are agents for German manufacturers are bringing in considerable tonnage of sulphite and seem to have no undue difficulty in finding buyers among United States paper mills. Fair-sized quantities also are being imported from Finland. With individual shipments ranging from 6,000 to 15,000 bales, such as were received at New York from European sources during the last month, it begins to look like pre-war times in the imported pulp trade.

Receipts at the port of New York in November, and current market quotations follow:

Bleached sulphite	$ 4.25- 4.50
Unbleached sulphite, No. 1	2.65- 3.00
Easy bleaching	3.25- 3.50
Mitscherlich unbleached	3.00- 3.25
Kraft	2.60- 3.00
Ground wool, per ton	32.00-36.00

Scandinavian-American Trading Co., 1,026 bls. from Gothenburg, 4,650 bls. from Hernosand, 6,000 bls. from Sweden and 2,206 bls. from Copenhagen; Chicoutimi Pulp & Paper Co., 5,081 bls. from Gaspe; Parsons Trading Co., 813 bls. from Gothenburg; H. Hollesen, 1,000 bls. from Hamburg and 5,090 bls. from Bremen; C. L. Robinson, 18,150 bls. from Gothenburg and 10,728 bls. from Sweden; American Writing Paper Co., 975 bls. from Gothenburg; E. M. Sergeant & Co., 1,240 bls. from Christiania; Irving National Bank, 6,100 bls. from Trangsund and 6,360 bls. from Hango; National Bank of Commerce, 800 bls. from Gothenburg; Borregaard Co., 970 bls. from Gothenburg; A. J. Pagel & Co., 5,000 bls. from Gefae; Castle, Gottheil & Overton, 3,250 bls. from Bremen and 36 bls. from Rotterdam; American Woodpulp Corp., 1,181 bls. from Copenhagen, 500 bls. from Sundsvall and 500 bls. from Rotterdam; J. Andersen & Co., 1,650 bls. from Christiania; Lagerloef Trading Co., 2,500 bls. from Hango; Guaranty Trust Co., 376 bls. from Hamburg; Fred Enders & Co., 1,140 bls. from Gothenburg; E. Butterworth & Co., 160 bls. from Christiania; Diesen Wood Co., 250 bls. from Kotka; Order, 13,794 bls. from Gothenburg, 400 bls. from Christiania, 6,600 bls. from Sweden, 4,248 bls. from Kotka, 4,664 bls. from Viborg, 17,040 bls. from Gaspe, 16,435 bls. from Hango, 340 bls. from Copenhagen and 3,033 bls. from Hamburg.

Paper Stock

Imports of papermaking materials into the United States during November were probably heavier than in any month thus far this year. Official figures of the tonnage brought in are not yet available, but judging from the arrivals at the port of New York as shown on the manifests of incoming steamers, larger quantities of rags, baggings, ropes and other paper mill raw stock were received last month than in a long time. Obviously, most of the goods reaching American ports within the past month were against orders placed in September and October, when paper manufacturers began to feel the revival of demand for their product. Current buying has let up to a considerable extent, and it is likely importations will decrease in the near future until larger requirements again bring consumers into the market to buy.

Imports of old rope last month were particularly heavy, something over 4,000 bales and coils of old rope arriving at the port of New York alone during November. Rags also were received in good quantity. Arrivals through the port of New York in November follow:

Old Rope

E. J. Keller Co., 697 coils from Hull, 78 coils from Glasgow, 68 coils from Liverpool, 91 bls. from Rotterdam and 114 coils from Leith; Brown Bros. & Co., 585 coils from Hull, 222 coils from Bristol and 75 coils from Liverpool; Ladenburg, Thalman & Co., 96 coils from Hamburg and 86 coils from Bristol; Salomon Bros. & Co., 109 coils and 25 bls. from Gothenburg and 551 coils from Hull; Baird-Daniels Co., 72 coils from Rotterdam; American Woodpulp Corp., 51 bls. from Hamburg; First National Bank of Boston, 77 bls. from Antwerp and 69 coils from Rotterdam; Atlantic National Bank, 103 coils from Antwerp; George W. Millar & Co., 103 coils from Hull; Irving National Bank, 38 bls. from Glasgow; International Purchasing Co., 83 bls. from Havre and 91 coils from Gothenburg; Mechanics & Metals National Bank, 143 coils from London and 149 bls. from Bremen; Schulz & Ruckgaber, 72 coils from Liverpool; American Express Co., 121 coils from London; Order, 182 coils from Rotterdam.

Old Bagging

E. Butterworth & Co., 184 bls. from Rotterdam; Equitable Trust Co., 165 bls. from Bordeaux; E. J. Keller Co., 697 bls. from Rotterdam; Order, 328 bls. from Liverpool.

Rags

Daniel M. Hicks, Inc., 160 bls. from Havre; Mechanics & Metals National Bank, 795 bls. from Havre and 666 bls. from Bremen; P. Berlowitz, 223 bls. from Bremen and 376 bls. from Rotterdam; E. J. Keller Co., 841 bls. from Hamburg, 1,724 bls. from Copenhagen, 1,675 bls. from Rotterdam, 48 bls. from Antwerp, 43 bls. from Bremen, 616 bls. from Havre and 235 bls. from Bordeaux; Goldman, Sachs & Co., 884 bls. from

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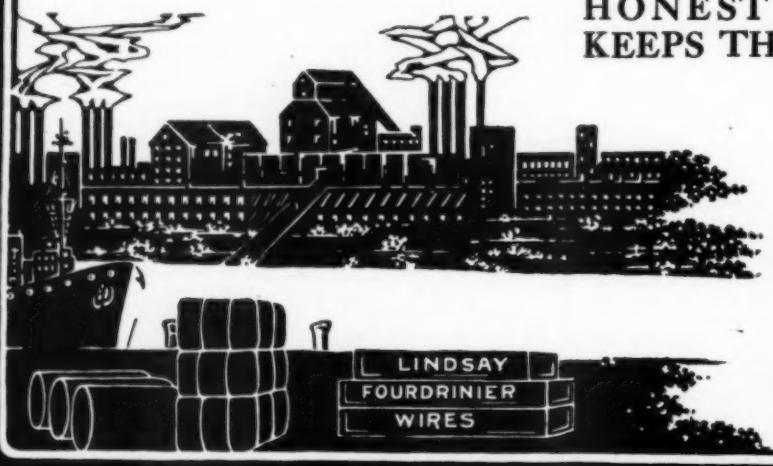
Lindsay Fourdrinier Wires

In Many Mills



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Cheney Bigelow Wire Works

Established 1842 SPRINGFIELD, MASS.

Hamburg, 438 bls. from Antwerp, 447 bls. from Havre and 1,229 bls. from Bordeaux; American Woodpulp Corp., 546 bls. from Hamburg; E. Butterworth & Co., 152 bls. from Glasgow and 399 bls. from Rotterdam; R. F. Downing & Co., 132 bls. from London and 38 bls. from Rotterdam; Albion Trading Co., 551 bls. from Rotterdam, 206 bls. from Liverpool and 183 bls. from Bordeaux; W. Hughes & Co., 143 bls. from Rotterdam and 487 bls. from Hamburg; G. Mathes Co., 71 bls. from Rotterdam; Castle, Gottheil & Overton, 108 bls. from Antwerp and 411 bls. from Rotterdam; Guaranty Trust Co., 40 bls. from Hamburg and 572 bls. from Antwerp; Brown Bros. & Co., 913 bls. from Antwerp; Wilkinson Bros. & Co., 443 bls. from Copenhagen; Equitable Trust Co., 81 bls. from Havre and 349 bls. from London; American Wool Stock Co., 111 bls. from Liverpool; Bernard, Judae & Co., 61 bls. from London; Bankers Trust Co., 399 bls. from Hamburg; Chemical National Bank, 96 bls. from Bremen; Irving National Bank, 224 bls. from Hamburg; Ladenburg, Thalman & Co., 90 bls. from Hamburg and 19 bls. from Havre; Central National Bank, 184 bls. from Havre; International Purchasing Co., 25 bls. from Havre; Order, 214 bls. from Glasgow, 68 bls. from Liverpool, 467 bls. from Rotterdam, 82 bls. from Bremen and 554 bls. from Hamburg.

Miscellaneous Paper Stock

Guaranty Trust Co., 296 bls. from Glasgow; E. Butterworth & Co., 312 bls. from Belfast; Mechanics & Metals National Bank, 223 bls. from London, 349 bls. from Havre and 41 bls. from Dundee; Brown Bros. & Co., 40 bls. from Liverpool; Castle, Gottheil & Overton, 95 bls. from Antwerp; E. J. Keller Co., 340 bls. from Dundee; Crane & Co., 24 bls. from Dundee; Order, 25 bls. from Antwerp and 75 bls. from Glasgow.

Paper

There is no outstanding feature at present in importations of new paper into the United States. Germany and the Scandinavian countries continue to ship moderate lots of news print to the American market, and receipts of print paper during November were probably a little larger than in the several preceding months. Usual supplies of cigarette, filter, hanging and wrapping papers were received last month from various sources in Europe. Arrivals at the port of New York in November follow:

Cigarette

American Tobacco Co., 376 cs. from Havre and 1,808 cs. from Bordeaux; Rose & Frank Co., 131 cs. from Havre; Bernard, Judae & Co., 17 cs. from Havre; R. J. Reynolds Tobacco Co., 560 cs. from Bordeaux; Gluckman & Strauck, 13 cs. from Bordeaux; Surbrug Co., 30 cs. from Havre; Southern Pacific Co., 6 cs. from Havre; P. J. Schweitzer, 207 cs. from Marseilles and 186 cs. from Bordeaux; Hensel, Bruckmann & Lorbacher, 3 cs. from Hamburg; Coenca, Morrison & Co., 7 cs. from Havre.

Printing

Parsons & Whittemore, 70 rolls from Rotterdam; D. S. Walton & Co., 5,021 rolls from Hamburg and 144 rolls from Gothenburg; L. A. Consmiller, 527 cs. from Rotterdam; Chase National Bank, 254 rolls from Helsingfors; American Transoceanic Traders Co., 124 rolls from Helsingfors; C. K. MacAlpine, 3,507 rolls from Gothenburg; Stone, Larsen & Co., 27 rolls from Christiania; Mail & Express Co., 294 rolls from Christiania; A. Moltzan, 113 rolls from Christiania; E. C. Melby, 291 rolls from Christiania; Borregaard Co., 85 rolls from Gothenburg; Sun Printing & Publishing Co., 680 rolls from Gothenburg; B. F. Drakenfeld & Co., 36 cs. from Liverpool; Chemical National Bank, 503 rolls from Hamburg; H. W. Robinson & Co., 2 cs. from Havre; Terre Haute Tribune Co., 55 rolls from Christiania; American Woodpulp Corp., 382 rolls from Sunsvall; American Express Co., 765 rolls from Sundsvall; New York American, 2,517 rolls from Norrkoping; National City Bank, 1,195 rolls from Gothenburg, 2,185 rolls from Hallstavik and 317 rolls from Copenhagen; C. L. Robinson, 78 rolls from Sundsvall and 1,128 rolls from Gothenburg; National Bank of Cincinnati, 217 rolls from Hamburg; H. S. Chalfant, 30 rolls from Hamburg; Sherwin Bros., 72 rolls from Hamburg; Ladenburg, Thalman & Co., 271 rolls from Hamburg; Agros Corp., 254 rolls from Kotka; Haring Paper Corp., 494 rolls from Christiania; J. P. Hefferman Paper Co., 471 rolls from Gothenburg; Paper House of Pennsylvania, 25 rolls from Gothenburg; Wilkinson Bros. & Co., 408 rolls from Gothenburg; Brown Bros. & Co., 3,170 rolls from Gothenburg; Agar Bernson Corp., 37 rolls from Bremen; H. Reeve Angel & Co., 643 rolls from Hango; Canfield Paper Co., 152 rolls from Hango; P. Puttmann, 11 cs. from Hamburg; Order, 678 rolls from Christiania and 142 rolls from Antwerp.

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Physiologists agree that in order to keep the body in a normal state of health, a man should drink the equivalent of not less than seven glasses of water each day. Pure drinking water is a primary requisite for hygienic living and helps to keep the body free from all intestinal disturbances.

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This fountain includes a barrel of 1¼" thick oak, painted outside; cover of double thickness; galvanized pipe coil through which water passes to drinking head without coming in contact with ice, and a heavy vitreous china bowl with either cast brass bubbling head with self-closing stop or "Vertico-Slant" stream from which glass can be readily filled.

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SOFTENING & FILTRATION
FOR BOILER FEED AND
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Wrapping

Republic Bag & Paper Co., 3,127 rolls from Hamburg; Ladenburg, Thalman & Co., 571 rolls from Hamburg; Wilkinson Bros. & Co., 53 rolls from Rotterdam, 970 rolls and 363 bls. from Gothenburg; Coy-Hunt Co., 25 bls. and 62 rolls from Gothenburg; Philadelphia National Bank, 126 rolls from Hamburg; H. Reeve Angel & Co., 72 rolls from Helsingfors; J. P. Hefferman Paper Co., 192 bls. from Gothenburg; Order, 59 bls. from Gothenburg and 14 cs. from Hamburg.

Hanging

W. H. S. Lloyd & Co., 20 bls. from London; A. C. Dodman, 68 bls. from Liverpool and 5 bls. from Antwerp; R. F. Lang, 1,356 bls. from Hamburg; Prager Co., 791 rolls from Antwerp and 172 rolls from Hamburg; H. L. Diament & Co., 2 cs. from Antwerp; G. W. Sheldon & Co., 2 cs. from Hamburg.

Writing

Stern Bros., 5 cs. from Havre; F. B. Vandegrift & Co., 7 cs. from London; J. W. Hampton, Jr., & Co., 6 cs. from Hamburg; Goodman & Levy, 4 cs. from Havre; E. Stegemann, 2 cs. from Hamburg; Whiting-Patterson Co., 3 bls. from Gothenburg; Order, 2 cs. from London.

Drawing

Favor, Ruhl & Co., 6 cs. from London; Keuffel & Esser Co., 96 rolls from Hamburg and 3 cs. from Rotterdam.

Filter

Lunham & Moore, 2 cs. from Bremen; J. Manheimer, 40 bls. from Bordeaux; E. Fougera & Co., 45 cs. from Bordeaux; American Express Co., 12 bls. from Bordeaux; G. Lueders & Co., 5 bls. from Bordeaux.

Tissue

Meadows, Wye & Co., 5 cs. from Liverpool; R. Hoe & Co., 3 cs. from London.

Boards

Bendix Paper Co., 55 cs. from Hamburg; Wiebush Calendar Importing Co., 31 cs. from Hamburg; International Forwarding Co., 21 cs. from Hamburg; Hermes Bros., 13 cs. from Hamburg; Central Trust Co., 10 cs. from Hamburg; G. H. Goldenberg, 2 cs. from Hamburg; A. Harder & Rosenberg, 12 cs. from Hamburg; Bernard, Judae & Co., 5 cs. from Hamburg; Netherland Bank, 143 rolls from Hamburg; Knauth, Nachod & Kuhne, 18 cs. from Hamburg; J. Zimmerman & Co., 34 cs. from Genoa; L. Karger, 2 cs. from Hamburg; D. C. Andrews & Co., 2 cs. from Bremen; Maurice O'Meara Co., 63 rolls from Rotterdam; Order, 4 bls. from Christiania and 138 rolls from Rotterdam.

Miscellaneous

H. W. Robinson & Co., 2 cs. from Bremen; Heule Wax Paper Mfg. Co., 10 cs. from Havre; Wagner Bros. & Co., 3 cs. from Havre; Kalamazoo Vegetable Parchment Co., 102 bls. from Buenos Aires; Lindt Chocolate Co., 2 cs. from Hamburg; Lunham & Moore, 36 cs. from Rotterdam; C. F. Etherington & Co., 28 cs. from Glasgow; Japan Paper Co., 20 cs. from Havre, 15 cs. from Gothenburg and 157 cs. from Genoa; Goodman & Levy, 9 cs. from Havre; H. D. Catty & Co., 8 cs. from Havre; Brooks Paper Co., 7 cs. from London; Kaufman & Straus Co., 5 cs. from Hamburg; Irving National Bank, 25 cs. from Hong Kong; Bradford Co., 9 cs. from Hamburg; Guaranty Trust Co., 9 cs. from Hamburg; C. Wilderman & Co., 14 cs. from Hamburg; F. B. Vandegrift & Co., 2 cs. from Hamburg; E. Daiber, 8 cs. from Antwerp; H. D. Catty & Co., 95 cs. from Havre; Atlantic Forwarding Co., 2 cs. from Havre and 4 cs. from Hamburg; Canson & Montgolfer, 19 cs. from Havre; Chas. W. Williams & Co., 8 bls. from Havana; F. Weber & Co., 100 cs. from Genoa; Uniforeign Importing Co., 4 cs. from Genoa; Havana Trading Co., 1,105 cs. from Marseilles; W. A. Foster & Co., 66 cs. from Rotterdam; W. Van Doorn, 4 cs. from Rotterdam; Phoenix Shipping Co., 6 cs. from Hamburg; A. Hoffman, 40 cs. from Hamburg; Coenca, Morrison & Co., 20 cs. from Hamburg; Wilkinson Bros. & Co., 5 cs. from Havre; Borden & Liley Paper Co., 7 cs. from Antwerp; Defender Photo Supply Co., 10 cs. from Antwerp; Favor, Ruhl & Co., 10 cs. from Genoa; G. W. Sheldon & Co., 407 cs. from Bremen; Happel & McAvoy, 3 cs. from Hamburg; Kern Commercial Corp., 26 cs. from Rotterdam; American Express Co., 4 cs. from London; C. B. Richard & Co., 2 cs. from Hamburg; Baldwin Universal Co., 3 bls. from Hamburg; Globe Shipping Co., 147 cs. from Rotterdam; Order, 2 cs. from Hamburg.

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A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

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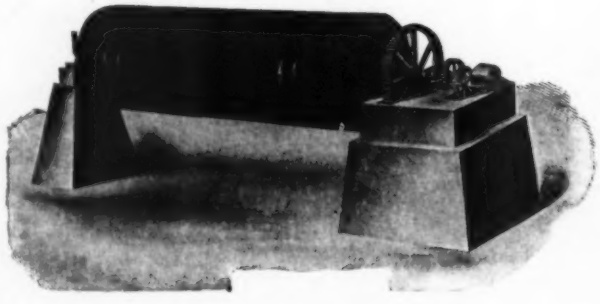

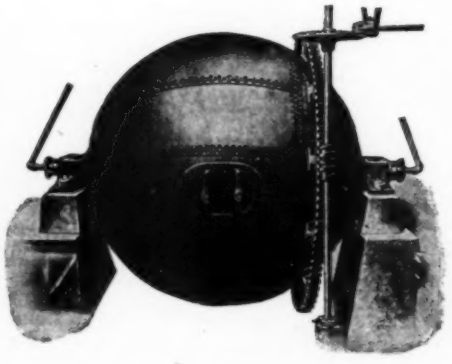

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William A. Hardy & Sons, Fitchburg, Mass.

ACID RESISTING PAINT
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AGITATOR EQUIPMENT
The Hill Clutch Co., Cleveland, Ohio.
Moore & White Co., Philadelphia, Pa.

AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

ALKALI
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, 22 William St., N. Y. C.

ANGLE VALVES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago.
L. A. DeGuere, Wisconsin Rapids, Wis.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

AUTOMATIC COOKING CONTROL
Trimbey & Allen, Glens Falls, N. Y.

AUTO TRUCKS
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BALLS (Brass)
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BALLS (Iron and Steel)
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BANDLESS ROLLS
Dayton Globe Iron Works, Dayton, O.
Valley Iron Works Co., Appleton, Wis.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

BEATER BARS
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATER BED PLATES
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATER ROLL FILLING
John W. Bolton & Sons, Inc., Lawrence, Mass.

BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, Ohio.
Dayton Globe Iron Works, Dayton, O.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.

BELT CONVEYORS
Weller Manufacturing Co., Chicago, Ill.

BELT DRIVES
The Hill Clutch Co., Cleveland, Ohio.
The Link Belt Co., Chicago, Ill.
Weller Manufacturing Co., Chicago, Ill.

BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

BLEACHING POWDER
Pennsylvania Salt Mfg. Co., Philadelphia.

BLEACHING (Propellers)
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BOILERS
J. F. Davis, Chicago.
Murray Iron Works Co., Burlington, Iowa.

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Cheney Bigelow Wire Works, Springfield, Mass.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

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Union Sulphur Co., 17 Battery Place, New York City.

BRONZE CASTINGS
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BUNDLING PRESSES
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CALENDERS
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Farrel Foundry & Machine Co., Ansonia, Conn.
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.
Smith & Winchester Mfg. Co., So. Windham, Conn.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N.Y.

CALENDER ROLLS
Farrel Foundry & Machine Co., Ansonia, Conn.
Holyoke Machine Co., Holyoke, Mass.

CASEIN
Casein Mfg. Co., New York City.

CASTINGS (Iron & Brass)
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CAST IRON PIPE
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Glamorgan Pipe & Foundry Co., Lynchburg, Va.

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Glamorgan Pipe & Foundry Co., Lynchburg, Va.

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American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
E. M. Cross Mach. Co., Berlin, N. H.
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

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Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
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Littleford Bros., Cincinnati, O.

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Valley Iron Works Co., Appleton, Wis.

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John W. Bolton & Sons, Inc., Lawrence, Mass.

CHIP SCREENS
Weller Manufacturing Co., Chicago, Ill.

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COAL BUNKERS
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CONSISTENCY REGULATOR
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L. A. De Guere, Wisconsin Rapids, Wis.
George F. Hardy, 309 Broadway, New York City.
Management Eng. & Dev. Co., Dayton, Ohio.

CONSULTING ENGINEERS (Power)
B. M. Baxter, Kirby Bldg., Cleveland.

CONVEYORS
Link-Belt Co., Chicago, Ill.
Weller Manufacturing Co., Chicago, Ill.

CORES (Collapsable)
Smith & Winchester Mfg. Co., So. Windham, Conn.

CORLISS ENGINES
Murray Iron Works Co., Burlington, Iowa.

CRANES
The Brownhoist Co., Cleveland, Ohio.
Northern Engineering Works, Detroit, Mich.
The Link Belt Co., Chicago, Ill.
McMyler Interstate Co., Bedford, Ohio.

CREPE MACHINES
Hudson-Sharp Mach. Co., Green Bay, Wis.

CUTOUT BASES
Chicago Fuse Mfg. Co., Chicago, Ill.

CUTTERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MOLDS
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Glens Falls Machine Works, Glens Falls, N. Y.
The Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, Ohio.

DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Ohio
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.

DECKEL FRAME SUPPORTS
Huband & Nash, Menasha, Wis.

DIE PRESSES
Smith & Winchester Mfg. Co., So. Windham, Conn.

DIGESTERS
The Biggs Boiler Works Co., Akron, O.

DRINKING WATER FOUNTAINS
Rundle-Spence Mfg. Co., Milwaukee, Wis.

DRUM WINDERS
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

DRYER EXHAUST
Nash Engineering Co., So. Norwalk, Conn.

DRYER FELTS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons.
Lockport Felt Co., Lockport, N. Y.
Shuler and Benninghofen, Hamilton, Ohio.

DYESTUFFS
Binney & Smith, 81-83 Fulton St., N. Y. City.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
H. A. Metz & Co., Inc., 122 Hudson St., New York City.
The Newport Chemical Works, Inc., Passaic, N. J.
Standard Ultramarine Co., Huntington, W. Va.

DUST COLLECTING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

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Dryers: Four 48" x 111", sixteen 48" x 106", ten 48" x 68", one 84" x 67", eleven 42" x 66".
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Chilled Calenders: One 66" face, five roll.
Dillon Doctors: for Machine Calenders 60" to 120" face.
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Jordans: One Wagg Majestic, three No. 2 Dillon Improved, one Large Horne, five Monarch, two Pope Brushing engines.
Screens: Three 12 plate open side Packer.
Stuff Pumps: Deane triplex 8" x 12", Gould triplex 8" x 10", Sandusky triplex 4" x 6".
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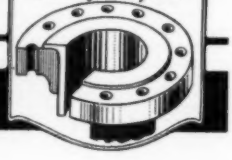

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ELECTRIC HOISTS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.

ELEVATORS
Link Belt Co., Chicago
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

ENGINES
The Brownell Co., Dayton, O.
Murray Iron Works Co., Burlington, Iowa.
Nordberg Mfg. Co., Milwaukee, Wis.

ENGINEERS
B. M. Baxter, 5716 Euclid Ave., Cleveland, O.
James L. Carey, 208 North Laramie St., Chicago, Ill.
George F. Hardy, 309 Brodway, New York City.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
Management Engineering and Development Co., Dayton, O.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

EVAPORATORS:
Charles Ordway, 25 Church St., N. Y. City.
Swenson Evaporator Co., Chicago, Ill.

EXHAUSTERS
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benninghofen, Hamilton, Ohio
Waterbury Felt Co., Skaneateles Falls, N. Y.

FELT ROLLS
Rodney Hunt Machine Co., Orange, Mass.

FELT AND WIRE GUIDES
Huband and Nash, Menasha, Wis.
Moore & White Co., Philadelphia, Pa.

FENCE
Cyclone Fence Co., Waukegan, Ill.

FILTER (Continuous Suction)
Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Oliver Continuous Filter Co., Los Angeles, Calif.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc., Philadelphia, Pa.
Norwood Eng. Co., Florence, Mass.
The Permutit Co., 440 Fourth Ave., N. Y. C.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

FLUID METERS
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

FOURDRINIER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.

FRICTION CLUTCHES
The Hill Clutch Co., Cleveland, Ohio.
Moore and White Co., Philadelphia, Pa.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

FUSE PLUGS
Chicago Fuse Mfg. Co., Chicago, Ill.

FUSE WIRE
Chicago Fuse Mfg. Co., Chicago, Ill.

FUSES (Cartridge)
Chicago Fuse Mfg. Co., Chicago, Ill.

FUSES (Old Code)
Chicago Fuse Mfg. Co., Chicago, Ill.

GAUGES
Manning Gauge Co., Boston, Mass.

GEARS
The Hill Clutch Co., Cleveland, Ohio.
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
Weller Manufacturing Co., Chicago, Ill.

GENERATORS
Charleston Industrial Corp., Nitro, W. Va.

GLUES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

GRANITE ROLLS
Jones Bros. Co., Barre, Vt.

GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Holyoke Machine Co., Holyoke Mass
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

HEATING SYSTEMS
Skinner Bros. Co., 1444 S. Vandeventer Ave., St. Louis, Mo.

HOISTING AND CONVEYING SYSTEMS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

HYDRAULIC TURBINES
Holyoke Machine Co., Holyoke, Mass.
S. Morgan Smith Co., York, Pa.

INSTRUMENTS (Fluid Meter)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

IRON AND STEEL PRODUCTS
Brown, Wales & Co., Boston, Mass.

JORDAN ENGINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

JORDAN FILLINGS
J. W. Bolton & Sons, Inc., Lawrence, Mass
The Shartle Bros. Mach. Co., Middletown, O.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

KNIVES
John W. Bolton & Sons, Inc., Lawrence, Mass.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

LAYBOYS
Moore and White Co., Philadelphia, Pa.

LENNOX DRIVES
F. L. Smidth & Co., 50 Church St., New York, N. Y.

LINE SHAFT BEARINGS
The Hill Clutch Co., Cleveland, Ohio.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

MECHANICAL PULP
J. Andersen & Co., 21 E. 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

METERS (Fluid)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MIXING SYSTEM
Trimbey & Allen, Glens Falls, N. Y.

MILL WHITE
E. I. Du Pont de Nemours & Co., Wilmington, Del.

NAPKIN FOLDERS
Hudson-Sharp Mach. Co., Green Bay, Wis.

NAVAL STORES
Hercules Powder Co., Wilmington, Del.

PAINTS
E. I. Du Pont de Nemours & Co., Wilmington, Del.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER BOARDS
C. L. La Boiteaux, 200 Fifth Ave., N. Y. C.
Dana T. McIver, 116 N. Michigan Ave., Chicago.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass
Smith & Winchester Mfg. Co., South Windham, Conn.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER DISTRIBUTORS
Dana T. McIver, 116 N. Michigan Ave., Chicago.

PAPER EXPORTERS AND IMPORTERS
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PAPER MACHINES
Beloit Iron Works, Beloit, Wis.
The Black-Clawson Co., Hamilton, O.
Smith & Winchester Mfg. Co., South Windham, Conn.
Valley Iron Works, Appleton, Wis.

PAPER MACHINE DRIVES
Harland Eng. Co., Montreal, Can.

PAPER MANUFACTURERS
Bardeen Paper Co., Otsego, Mich.
Bermingham & Prosser Co., Otis Bldg., Chicago, Ill.
Bryant Paper Co., Kalamazoo, Mich.
Eastern Manufacturing Co., 501 Fifth Ave., N. Y. City.
Hammermill Paper Co., Erie, Pa.
Lincoln Paper Mills, Elkhart, Ind.
Marathon Paper Co., Rothschild, Wis.
Munising Paper Co., Munising, Mich.
Nekoosa-Edwards Paper Co., Port Edwards, Wis.
Oxford Paper Co., 200 Fifth Ave., N. Y. City.
Poland Paper Co., 200 Fifth Ave., New York
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.
Wolverine Paper Co., Otsego, Mich.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.
Detroit Chemical Works, Detroit, Mich.
Diamond Alkali Co., Pittsburgh, Pa.
Invincible Paper & Pulp Corporation, 135 Broadway, N. Y. City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Mendelson Bros. Paper Stock Co., 910 Michigan Ave., Chicago.
Paper Trading Co., Boston, Mass.
Penn Paper Stock Co., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perkins-Goodwin Co., 53 W. 42nd St., N. Y. C.

PAPER MILL BROKERS
Gibbs-Brower Co., 261 Broadway, N. Y. C.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER TESTERS
Thwing Instrument Co., 3353 Lancaster Ave., Philadelphia, Pa.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

PENSTOCKS
The Biggs Boiler Works Co., Akron, O.

PERFORATED METALS
Harrington & King Perforating Co., 615 No. Union Ave., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

PIPE RIVETED STEEL
The Biggs Boiler Works, Akron, O.

PIPING EQUIPMENT
M. J. Dougherty Co., 25th and Washington Ave., Philadelphia, Pa.
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

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M. J. Dougherty Co., 25th and Washington Ave., Philadelphia, Pa.
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co., Toledo, O.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

POWER TRANSMISSION
Link-Belt Co., Chicago, Ill.
The Hill Clutch Co., Cleveland, Ohio.
Rodney Hunt Machine Co., 45 Mill St., Orange, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
Valley Iron Works, Williamsport, Pa.
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

PRESS ROLLS
Rodney Hunt Machine Co., Orange, Mass.

PROTECTION FENCES
Cyclone Fence Co., Waukegan, Ill.

PULP (Chemical)
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.
M. Gottesman & Co., 18 E. 41st St., New York City.
Daniel M. Hicks, 200 Fifth Ave., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Price & Pierce, Ltd., 30 East 42nd St., New York City.
The Pulp & Paper Trading Co., 21 East 40th St., New York City.
Scandinavian-American Trading Co., 50 East 42d St., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PULP AND PAPER MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Biggs Boiler Works Co., Akron, O.
The Black-Clawson Co., Hamilton, Ohio.
Charleston Industrial Corp., Nitro, W. Va.
Davis, Frank H., Cambridge, Mass.
Glens Falls Machine Co., Glens Falls, N. Y.
Improved Paper Machinery Co., Nashua, N. H.
Mills Mach. Co., Lawrence, Mass.
Moore & White Co., Philadelphia, Pa.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Noble & Woods Machine Co., Hoosick Falls, N. Y.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

PULP GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.

PULP MILL BROKERS
Gibbs-Brower Co., 261 Broadway, N. Y. C.

PULP STONES
The Cleveland Stone Co., 1836 Euclid Ave., Cleveland, O.
The Smallwood-Low Stone Co., Lisbon, Ohio.

PUMPS (Stock)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glens Falls Machine Co., Glens Falls, N. Y.
Gregg Pump Co., Kansas City, Mo.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Centrifugal)
American Steam Pump Co., Battle Creek, Mich.
Cross, E. M., Mach. Co., Berlin, N. H.
Fairbanks, Morse & Co., 900 Wabash Ave., Chicago, Ill.
Hayton Pump & Blower Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Deep Well)
Gregg Pump Co., Kansas City, Mo.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
Nash Eng. Co., South Norwalk, Conn.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.

REELS
Smith & Winchester Mfg. Co., So. Windham, Conn.

ROLL GRINDING MACHINES
Farrel Foundry & Machine Co., Ansonia, Conn.

ROLLER BEARINGS
Hart Roller Bearing Co., Orange, N. J.

ROOFS
U. S. Gypsum Co., Wells & Monroe Sts., Chicago, Ill.

ROTARY BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

ROZIN
Hercules Powder Co., Wilmington, Del.

RUBBER ROLLS
The American Wringer Co., Woonsocket, R. I.

SAVE-ALLS
Glens Falls Machine Co., Glens Falls, N. Y.

SCALES
Fairbanks-Morse & Co., 900 Wabash Ave., Chicago, Ill.

SCREENS
The Bagley & Sewall Co., Watertown, N. Y.
Union Iron Works, Bangor, Me.

SCREENS (Perforated Metal)
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.
Harrington & King Perforating Co., Chicago.
Weller Manufacturing Co., Chicago, Ill.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.
Union Screen Plate Co., Fitchburg, Mass.

SHOWER PIPES
Smith & Winchester Mfg. Co., So. Windham, Conn.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago, Ill.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.
Samuel M. Langston Co., Camden, N. J.
Meisel Press Mfg. Co., 948 Dorchester, Ave., Boston 25, Mass.

SMOKE STACKS (Steel)
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

SOOT BLOWERS
Diamond Power Specialty Co., Detroit, Mich.

SODA ASH
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, Inc., 22 Williams St., New York.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

SPEED REDUCERS
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.
Weller Mfg. Co., 1820 N. Kostner Ave., Chicago.

SPRAY NOZZLES
Buffalo Forge Co., Buffalo, N. Y.

STEEL PLATE CONSTRUCTION
The Biggs Boiler Works Co., Akron, O.
Hendrick Mfg. Co., Carbondale, Pa.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, Ohio.
Ticonderoga Machine Works, Ticonderoga, N.Y.

STOCK METER
Trimbey & Allen, Glens Falls, N. Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

STORAGE TANKS
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

SULPHITE (Strong Bleached and Easy Bleaching)
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

SULPHITE MACHINERY
The Biggs Boiler Works Co., Akron, O.
Stebbins Engineering Co., Watertown, N. Y.

SULPHUR
Union Sulphur Co., 17 Battery Place, New York City.

SULPHUR BURNERS
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

SWITCH BOXES
Chicago Fuse Mfg. Co., Chicago, Ill.

TANKS (Iron and Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

TANKS (Wooden)
Charleston Industrial Corp., Nitro, W. Va.
Curtis-Willis Co., 30 Church St., New York, N.Y.
Hauser-Stander Tank Co., Cincinnati, O.

TOILET ROLL WINDERS
Hudson-Sharp Mach. Co., Green Bay, Wis.

TRAPS
Ellis Drier Co., Chicago, Ill.

TRUCKS (Roll Handling)
The Elwell-Parker Elec. Co., Cleveland, Ohio.

TRUCKS (Industrial)
The Elwell-Parker Elec. Co., Cleveland, Ohio.

TURBINES (Hydraulic)
Rodney Hunt Machine Co., Orange, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Ave., Chicago, Ill.
S. Morgan Smith Co., York, Pa.

TURBINES (Steam)
The Terry Steam Turbine Co., Hartford, Conn.

VACUUM PUMPS
The Nash Eng. Co., South Norwalk, Conn.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVE FACING TOOLS
The Draper Mfg. Co., Port Huron, Mich.

VALVES
The Crane Co., Chicago, Ill.
G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, Ill.
Golden-Anderson Valve Spec. Co., 1293 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., The, Cincinnati, O.
The Wm. Powell Co., Cincinnati, Ohio.
Record Fdy. & Mach. Co., Livermore Falls, Me.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VARIABLE SPEED ENGINES
The Brownell Co., Dayton, Ohio.

VATS (Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

WASHER WIRES
The W. S. Tyler Co., Cleveland, Ohio.

WASTE PAPER STOCK
Mendelson Bros. Paper Stock Co., 910 S. Michigan Blvd., Chicago, Ill.

WATER FILTER
Glens Falls Machine Co, Glens Falls, N. Y.
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Holyoke Machine Co., Holyoke, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
S. Morgan Smith Co., York, Pa.

WET MACHINES
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

WOOD PIPE
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A. Wyckoff & Son Co., Elmira, N. Y.

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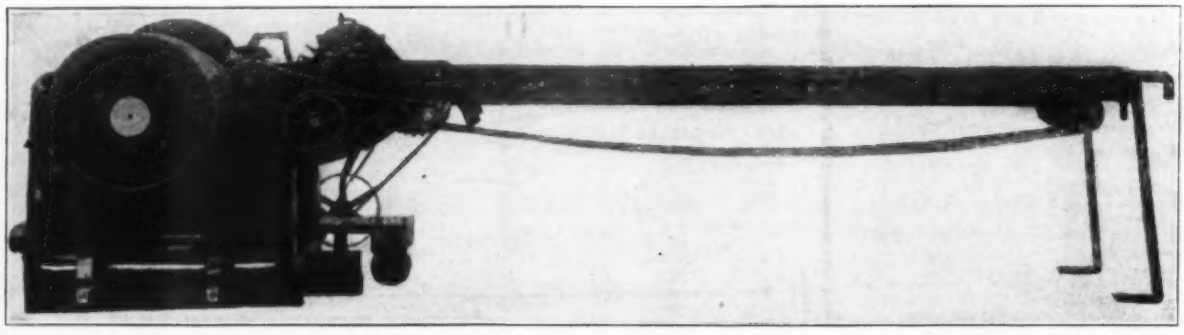

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